Access DB# 79678

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Andrew Wessman Examiner #: 78959 Date: 11/7/02
Art Unit: 1742 Phone Number 305-3163 Serial Number: 09/977,167
Mail Box and Bldg/Room Location: CP3-7D12 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

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Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: High Hardness highly ductile ferrous articles

Inventors (please provide full names): Tom Jackson, Anne Marie Fraboni

Earliest Priority Filing Date: 10/12/01 PCT/US02/32267 &

10/268,64

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

Please Search Method of claim 1

bainite-martensite structure

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STAFF ~~USE~~ ONLY		**Type of Search**		**Vendors and cost where applicable**	
Searcher:	John Calve	NA Sequence (#)		STN	
Searcher Phone #:		AA Sequence (#)		Dialog	
Searcher Location:		Structure (#)	✓	Questel/Orbit	
Date Searcher Picked Up:	11/15/02	Bibliographic	✓	Dr.Link	
Date Completed:	11/15/02	Litigation		Lexis/Nexis	
Searcher Prep & Review Time:	2 hr	Fulltext		Sequence Systems	
Clerical Prep Time:		Patent Family		WWW/Internet	
Online Time:	1 hr	Other		Other (specify)	

PTO-1590 (8-01)

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     FILE 'LREGISTRY' ENTERED AT 12:37:21 ON 15 NOV 2002
L1          2559 S FE/ELS (L) 2-9/ELC.SUB
                 E IRON/CN

     FILE 'REGISTRY' ENTERED AT 13:33:28 ON 15 NOV 2002
                 E IRON/CN
L2             1 S E3

     FILE 'HCAPLUS' ENTERED AT 13:33:45 ON 15 NOV 2002
L3        312935 S L2

     FILE 'LCA' ENTERED AT 13:33:53 ON 15 NOV 2002
L5          4974 S FERROUS# OR FERRIC# OR FERRITE# OR FERRUM# OR FE OR IRON OR S
L6           348 S AUSTEN? OR MARTEN? OR BAINIT?
L7          1639 S DEFORM? OR DISTORT? OR COMPRES?
L8          3832 S QUENCH? OR COOL? OR CHILL? OR (LOW###### OR DECREAS? OR REDUC

     FILE 'HCAPLUS' ENTERED AT 13:55:23 ON 15 NOV 2002
L9       1663249 S L3 OR L5
L10      2399580 S METAL##### OR ALLOY? OR AMALGAM? OR INGOT?
L11       666150 S L9 AND L10
L12        44566 S L11 AND L6
L13         6482 S L12 AND L7
L14         2658 S L13 AND L8

     FILE 'LCA' ENTERED AT 13:59:59 ON 15 NOV 2002
L15          186 S COLD###(3N)(WORK? OR ROLL? OR DRAWN?)
L16          734 S DEFORM?
L17              QUE (PLASTIC? OR COMPRESS? OR TENSIL?)
L18         2677 S FENCE?  OR CHAIN?(3N)LINK OR CYCLO? OR WIR? OR CABL?

     FILE 'HCAPLUS' ENTERED AT 14:05:07 ON 15 NOV 2002
L19              QUE PROCESS### OR METHOD? OR PRODUC? OR PROD# OR GENERAT? OR MA
L20        98217 S L6
L21       546777 S L7
L22              QUE L8
L23        49418 S L15
L24       226771 S L16
L25              QUE L17
L26       911181 S L18
L27         2118 S L14 AND L19
L28          173 S L27 AND L23
L29          156 S L28 AND L24
L30        47640 S L16(3N)L17
L31           47 S L28 AND L30
L32            3 S L31 AND L18
L33       610543 S 56/SX,SC
L34            6 S L31 AND L33
L35           41 S L31 NOT L34

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L36       250909 S L19 AND (IRON# OR FE OR FERROUS# OR FERRIT? OR STEEL)
L37         8154 S L36 AND L16
L38         1232 S L37 AND L8
L39          505 S L38 AND L10
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L40          27 S L39 AND L15
                E C21C/IC
L41      110615 S (C21C? OR C21D)/IC OR (C22C? OR C22F? OR C22K)/IC
L42          22 S L40 AND L41
L43           2 S L42 AND L18
L44          20 S L42 NOT L43

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L45          41 S L35 AND L8


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L46      404800 S L19 AND (IRON# OR FE OR FERROUS# OR FERRIT? OR STEEL)
L47       37778 S M27-A?/MC
L48       10931 S M27-B?/MC
L49       30911 S L46 AND (L47 OR L48)
L50       14851 S L49 AND L10
L51      174660 S L46 AND L10
L52         872 S L49 AND L16
L53         305 S L52 AND L8
L54         159 S L53 AND L10
L55          20 S L54 AND L15
L56       17298 S L16(3N)L17
L57          63 S L53 AND L56
L58           8 S L57 AND L15
L59           6 S L55 AND L20
L60           3 S L58 AND L20
L61          15 S L57 AND L20
L62          19 S L59 OR L60 OR L61

     FILE 'HCAPLUS' ENTERED AT 15:00:08 ON 15 NOV 2002
L63          41 S L45 AND L20

     FILE 'JAPIO' ENTERED AT 15:00:24 ON 15 NOV 2002
L64          33 S L39 AND L20
L65           4 S L40 AND L20
L66           4 S (L43 OR L44) AND L20

     FILE 'JAPIO' ENTERED AT 15:05:21 ON 15 NOV 2002
L67          33 S L64 AND L21
L68           4 S L43 OR L65 OR L66
L69          29 S L67 NOT L68
L70          18 S L44 NOT (L67 OR L68)

     FILE 'METADEX' ENTERED AT 15:09:06 ON 15 NOV 2002
L71      342050 S L19 AND (IRON# OR FE OR FERROUS# OR FERRIT? OR STEEL)
                E FE/ALI
L72          14 S E3
L73      342058 S L71 OR L72
L74      194534 S L73 AND L10
L75       33750 S L74 AND L20
L76        4687 S L75 AND L16
L77         184 S L76 AND L18
L78          38 S L77 AND L15

     FILE 'METADEX' ENTERED AT 15:15:04 ON 15 NOV 2002
L79          11 S L78 AND (MARTENSIT? AND AUSTENIT?)
L80          36 S L77 AND (MARTENSIT? AND AUSTENIT?)
L81          27 S L78 NOT L79
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FILE COVERS 1907 - 15 Nov 2002 VOL 137 ISS 21
FILE LAST UPDATED: 14 Nov 2002 (20021114/ED)

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=> d L63 1-41 cbib abs hitind hitrn
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L63 ANSWER 1 OF 41 HCAPLUS COPYRIGHT 2002 ACS
2002:473079 Document No. 137:50209 Effect of preliminary **cold plastic deformation** (**rolling**) on the structure and mechanical properties of thermally strengthened **steel** 45KhN2MFA. Volosevich, P. Yu.; Garasim, Yu. A.; Danilenko, N. I.; Adeev, V. M.; Nikonenko, D. I. (Inst. Metallofiz. im. G. V. Kurdyumova, NAN Ukrainy, Kiev, 03680, Ukraine). Metallofizika i Noveishie Tekhnologii, 24(3), 413-422 (Russian) 2002. CODEN: MNTEEU. ISSN: 1024-1809. Publisher: Natsional'na Akademiya Nauk Ukraini, Institut Metalofiziki im. G. V. Kurdyumova.

AB The influence of preliminary **cold plastic deformation** (**rolling**) on the change of structure and mech. properties of 45KhN2MFA **steel** after strengthening by direct elec. heating (2-5 K/s) for **austenitization** is studied. As shown, the **cold rolling** to 53%, independently on value of unit **redns.**, promotes the **decreasing temp.** of brittle fracture by 20.degree. at increasing yield stress by 10-15% in comparison with a undeformed **steel**. Such a regime of **cold rolling** does not **create** the **deformation** structure defects, which can lead to the premature failure. The stable realization of maximal resources of the **steel** strengthened by heat treatment can not be reached without elimination of non-**deformational** macrodefects initiating a premature failure.

CC 55-11 (Ferrous Metals and Alloys)

ST **cold plastic deformation rolling**
structure mech property **steel** macrodefect

IT **Plastic deformation**
(cold; effect of preliminary cold **plastic deformation** on structure and mech. properties of thermally strengthened **steel** 45KhN2MFA)

IT Brittle fracture
Crystal defects
Heat treatment
Mechanical properties

Rolling (**metals**)
(effect of preliminary cold **plastic deformation** on structure and mech. properties of thermally strengthened **steel** 45KhN2MFA)
IT Stress, mechanical
(yield; effect of preliminary cold **plastic deformation** on structure and mech. properties of thermally strengthened **steel** 45KhN2MFA)
IT 55256-72-9, 45KhN2MFA
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(effect of preliminary cold **plastic deformation** on structure and mech. properties of thermally strengthened **steel** 45KhN2MFA)

L63 ANSWER 2 OF 41 HCAPLUS COPYRIGHT 2002 ACS
2002:384153 Document No. 137:50146 Improved microstructural modeling of phase transformation in medium and high carbon **steels**. Newnham, S. J.; Vandenberghe, L.; Barteri, M.; Mecozzi, M.; Herzig, C. (Swinden Technology Centre, Corus UK Ltd., Moorgate, Rotherham, S60 3AR, UK). European Commission, [Report] EUR, EUR 20225, 1-137 (English) 2002. CODEN: CECED9. ISSN: 1018-5593.
AB In recent years, there were a significant no. of studies of ultra-fine grain size **steel**, following reports that such material, with its high strengths, could be achieved in **steels** under mass **prodn**. conditions. This one-year study was commissioned to investigate the **prodn**. and properties of ultra-fine grained **steels** to try to identify if this is indeed a potential, major com. opportunity warranting rapid and detailed further development, a potential niche-market **product**, or indeed just an academic curiosity. The work was performed by Corus-STC (with the Manchester Materials Science Center on subcontract), CRM-Gent, CSM-Terni and IEHK-Aachen. The objectives were: To survey current developments on Ultra-Fine (UF) **steels** world-wide; To obtain UF grain sizes (.apprx.1 .mu.) in some typical low C, HSLA and **austenitic** stainless **steels**, at the lab. or pilot mill scale; To assess the properties of such material, including prospects for superplastic or near-superplastic **forming**; To define the advantages of UF-grained **steels** for different applications; To recommend aspects warranting further study, whether concerning the fundamental **metallurgy** or the **process** technol., under appropriate European fora. Ultra-fine **ferrite** (UFF) can be **produced** by various schedules of hot/warm **rolling**, further assisted by **cold rolling** and annealing. All of these schedules and the further **processing** are rather demanding of the mill, in terms of heavy **deformations, low temps**./high loads, rapid annealing and **cooling**. The nature of the **deformation**, rather than simply the total strain, is important regarding the effectiveness of establishing UFF structures from rolling **austenite**. For obtaining UFF by warm rolling of **ferrite** /pearlite structures, the required total **deformation** cannot be accomplished effectively in multiple smaller passes, i.e. the strain will not accumulate during a sequence of practicable **deformations**, in a plain CMn feedstock. UFF is generally easier to obtain in the more **alloyed**/microalloyed compns., notably by allowing the required strain to be accumulated in more than one pass rather than a single, impracticably heavy rolling pass. The Ultra-Fine Dual Phase (UFDP) route established during the project was thought to be too complicated and thus expensive for adoption com. Surface Ultra-fine **Ferrite** (SUF)

plate is already established com. at the 2 .mu.m level, cf. NSC 'HIAREST' ship plate with their interest to pursue this to finer surface grains for further improved toughness. It has proved possible to achieve homogeneous grain sizes close to 1 .mu. in **austenitic** stainless **steel**, by heavy, cryogenic **deformation** followed by reversion of the **deformation**-induced **martensite** to **austenite** by annealing. It is suspected that sub-micron grain sizes could be achieved through further optimization of this **process** route. Properties UFF itself exhibits high strength but, as feared, poor plasticity with extensive Luedering and little work hardening. Ultra-Fine Dual Phase (UFDP) strip (**ferrite**/ **martensite**) can exhibit high strength and good ductility. There is a question about the ductile shelf energy of such material, which should be checked, although the ductile/brittle transition **temp**. is certainly much **reduced**. UFF material is certainly high strength, but this strength is sensitive to the grain size (in line with the Hall Fetch relation) so it would be difficult to **process** it to a customary, narrow range of property values. An ultra-fine grain size is more thermally stable than might be expected. To some extent this depends on the mechanism of its **formation** and how carbides in particular are arrayed in the structure. Welding of such material is liable to destroy the UF structure; high energy, laser welding can **produce** a satisfactory join in SUF plates. From the literature, although not tested exptl. within the project, the beneficial dual-phase effect should also be exhibited in ultra-fine high carbon (UFHC), **ferrite**/carbide aggregate (non-pearlitic) microstructures. The high strength and good ductility **makes** this an attractive proposition for plate or strip, bar or rod, and for feedstock for forging. UFHC can exhibit superplasticity (>1000% elongation) at warm working temps., **making** it an attractive feedstock for such **processing**. Higher strength, high toughness low-**alloyed** plate and sheet could be of great com. importance. However, UFF strip exhibits little difference between yield and ultimate tensile strengths, and with extensive Luedering upon yielding. Also, the high strength is extremely sensitive to grain size in the UF range, so it would be difficult to **make** a **product** with a reproducible, customarily narrow property range. Thus ultra-fine grains are not universally beneficial. Nevertheless, ultra-fine grains represent another metallurgical tool available to the industry. Whether for niche markets, or particularly in combination with other metallurgical factors, they must have the potential for new **products** which are com. viable. It is commonly assumed that substantial work hardening is also required here for optimum energy absorption, although some tests indicate that even conventional HS strip exhibits little work hardening at the high strain rates which can be encountered. There is still much controversy over the details of the alternative mechanisms involved and how to optimize the properties, and further academic research would be useful to clarify the situation.

CC 55-8 (Ferrous Metals and Alloys)

ST microstructural modeling phase transformation carbon **steel** welding mech property

IT Rolling (**metals**)
(hot/warm; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT Annealing
Cold rolling
Cryogenics
Elongation, mechanical
Fracture toughness
Grain size

Plasticity
Strain hardening
Structural phase transition
(improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT Carbides
RL: PNU (Preparation, unclassified); PREP (Preparation)
(improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT Welding of **metals**
(laser; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT Scale (deposits)
(oxide; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT **Plastic deformation**
(superplastic; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT Plasticity
(superplasticity; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT Tensile strength
(ultimate; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT 12597-69-2, **Steel**, properties
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(HSLA; improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT 12244-31-4P, **Austenite, preparation** 12427-24-6P, **Ferrite** (**ferrous metal** component)
12427-27-9P, Pearlite
RL: PNU (Preparation, unclassified); PREP (Preparation)
(improved microstructural modeling of phase transformation in medium and high carbon **steels**)

IT 11121-90-7, Carbon **steel**, properties 12597-68-1, **Austenitic** stainless **steel**, properties
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(improved microstructural modeling of phase transformation in medium and high carbon **steels**)

L63 ANSWER 3 OF 41 HCAPLUS COPYRIGHT 2002 ACS
2002:158764 Document No. 136:235253 Effect of the degree of preliminary **plastic deformation** and annealing time on mechanical properties of an **Fe**-Ni-Co-Ti shape memory **alloy**.
Titenko, A. N.; Kozlova, L. E.; Chernenko, V. A. (Inst. Magnetizma, NAN i MO Ukrainy, Kiev, 03142, Ukraine). Metallofizika i Noveishie Tekhnologii, 23(11), 1513-1524 (Russian) 2001. CODEN: MNTEEU. ISSN: 1024-1809. Publisher: Natsional'na Akademiya Nauk Ukraini, Institut Metalofiziki im. G. V. Kurdyumova.

AB As shown exptl., the incorporating of **cold-working** treatment of **quenched austenitic** specimens before ageing influences essentially on mech. properties of **austenite** and **martensite** in **Fe**-Ni-Co-Ti **alloy** as well as on the features of its **martensitic** and magnetic transformations. All mentioned parameters are nonmonotonic function of the strain value. At low values of strain, the max. magnitude of cyclic super-elastic strain equal to 2% is obsd.

CC 55-12 (Ferrous Metals and Alloys)

ST **plastic deformation** annealing mech property
iron nickel cobalt titanium; shape memory **alloy** mech
property **iron** nickel cobalt titanium
IT Annealing
Mechanical properties
Plastic deformation
Structural phase transition
(effect of preliminary **plastic deformation** and
annealing on mech. properties of shape memory **alloy**)
IT Shape memory **alloys**
RL: PRP (Properties); TEM (Technical or engineered material use); USES
(Uses)
(effect of preliminary **plastic deformation** and
annealing on mech. properties of shape memory **alloy**)
IT 12173-93-2P, **Martensite, preparation** 12244-31-4P,
Austenite, preparation
RL: PNU (Preparation, unclassified); PREP (Preparation)
(effect of degree of preliminary **plastic deformation**
and annealing time on mech. properties of **Fe**-Ni-Co-Ti shape
memory **alloy**)
IT 403499-15-0
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP
(Physical process); TEM (Technical or engineered material use); PROC
(Process); USES (Uses)
(effect of preliminary **plastic deformation** and
annealing on mech. properties of shape memory **alloy**)

L63 ANSWER 4 OF 41 HCAPLUS COPYRIGHT 2002 ACS
2001:874539 Document No. 136:9456 High-tensile strength **steel**
sheets having excellent ductility and impact resistance and
manufacture thereof. Kojima, Hirokatsu (Sumitomo Metal Industries
Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001335891 A2 20011204, 10 pp.
(Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-160296 20000530.
AB The high-tensile **steel** sheets contain C 0.05-0.25, Si
.ltoreq.2.0, Al 0.005-2.0, Mn 0.8-2.5, and P .ltoreq.0.05% with Si+Al
1.0-2.5%, and when the **steel** sheets are pre-molded with 10%
tensile bending **deformation** under thickness strain the
following relation is satisfied: (HVs-HVc)/HVo (HVo = Vickers hardness of
the sheet thickness center before molding, HVc = Vickers hardness of the
sheet thickness center after molding and galling, HVs = Vickers hardness
of the surface after molding and galling). The high-tensile **steel**
sheets are **manufd.** by hot rolling **steel** slab having
the above compn. at a rolling initiation temp. of .ltoreq.1050.degree. and
a finish rolling temp. of .gtoreq.800.degree., **cooling** to
750.degree. at .gtoreq.20.degree./s, coiling at .ltoreq.700.degree. but
.gtoreq.Tc (Tc = 430+70Mn+1000P), pickling, **cold rolling**
at a total draft of 40-80%, keeping in a **ferrite-**
austenite two phase temp. zone for 30-90 s, **cooling** to
450-700.degree. at .gtoreq.30.degree./s, keeping at 370-450.degree. for
200-400 s and **cooling** to room temp.
IC ICM C22C038-00
ICS B21B003-00; C21D009-46; C22C038-06; C22C038-16
CC 55-11 (Ferrous Metals and Alloys)
ST **steel** sheet rolling annealing tensile strength ductility impact
resistance
IT Annealing
Ductility
Rolling (**metals**)
Tensile strength
(**manuf.** of high-tensile strength **steel** sheets

having excellent ductility and impact resistance by rolling and annealing)

IT 137231-07-3, **processes** 146206-86-2, **processes** 211361-29-4, **processes** 377074-15-2, **processes** 377074-16-3, **processes** 377074-17-4 377074-18-5, **processes** 377074-19-6, **processes** 377074-20-9 377074-21-0
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(**manuf**. of high-tensile strength **steel** sheets having excellent ductility and impact resistance by rolling and annealing)

L63 ANSWER 5 OF 41 HCAPLUS COPYRIGHT 2002 ACS
2000:867046 Document No. 134:118799 Simulation of mechanical properties of ULCB_Mn **steel** sheets having a composite microstructure. Lis, Andrzej Kazimierz; Kolan, Cezary; Jeziorski, Leopold (Institute of Materials Engineering, Technical University of Czestochowa, Czestochowa, 42-200, Pol.). EUROMAT 99, Biannual Meeting of the Federation of European Materials Societies (FEMS), Munich, Germany, Sept. 27-30, 1999, Meeting Date 1999, Volume 3, 140-146. Editor(s): Brechet, Y. Wiley-VCH Verlag GmbH: Weinheim, Germany. (English) 2000. CODEN: 69AMNI.

AB Application of thermomech. treatment to **produce**,,in situ" composite material from ultra-low carbon high manganese **bainitic steel** (ULCB_Mn) and numerical prediction of mech. properties of sheets were presented. The composite microstructure was **created** by **formation** of thin elongated islands of **bainite** and lath **martensite** mixt. (BM) as reinforcing dispersoids in cold **deformed** ultra-low carbon **ferrite** matrix. The stability of that microstructure was evaluated after annealing. Simulation of **formation** of composite microstructure was confirmed by dilatometric studies of **steel** annealed in (.alpha.+.gamma.) range and fast **cooled** to **produce** different amt. of BM islands. The precise vol. fraction of BM phases has been established by quant. **method** and dilatometry. Quantification of dual-phases microstructure was performed by computerized Joyce Loebel optical microscope app. The effect of vol. fraction of BM islands, their stereometrical characteristics and amt. of cold **deformation** of **steel** on **tensile** properties have been analyzed. It has been shown that yield strength in the range of 600900 MPa can be achieved with satisfied ductility up to 16% for strips after annealing, which have typical discontinuous fibers (BM islands) and **metal** matrix (**Ferrite**) composite microstructures. The equations for phys. modeling of the microstructure- properties- relationships were given. Prolonged time of annealing up to 6000 s at 723 K does not greatly change the main features of DF-MMC (discontinuous fibers **metal** matrix composite) microstructure and tensile properties of the investigated **steel**.

CC 55-11 (Ferrous Metals and Alloys)

ST simulation microstructure manganese **steel** thermomech rolling annealing; tensile yield strength manganese **steel** thermomech rolling annealing; ductility plasticity ULCB manganese **steel** thermomech rolling annealing

IT Annealing
Cold rolling
Ductility
Microstructure
Plasticity
Simulation and Modeling, physicochemical
Tensile strength

Yield strength
(simulation of mech. properties of thermomech. treated ultra-low carbon high manganese **bainitic steel** sheets having composite microstructure)

IT Metalworking
(thermomech. treatment; simulation of mech. properties of thermomech. treated ultra-low carbon high manganese **bainitic steel** sheets having composite microstructure)

IT 87348-63-8, 04G4Ti
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(simulation of mech. properties of thermomech. treated ultra-low carbon high manganese **bainitic steel** sheets having composite microstructure)

L63 ANSWER 6 OF 41 HCAPLUS COPYRIGHT 2002 ACS

2000:767492 Document No. 133:312052 Electrochemically induced annealing of stainless-**steel** surfaces. Burstein, G. T.; Hutchings, I. M.; Sasaki, K. (Department of Materials Science and Metallurgy, University of Cambridge, Cambridge, CB2 3QZ, UK). Nature (London), 407(6806), 885-887 (English) 2000. CODEN: NATUAS. ISSN: 0028-0836. Publisher: Nature Publishing Group.

AB Modification of the surface properties of **metals** without affecting their bulk properties is of technol. interest in demanding applications where surface stability and hardness are important. When **austenitic** stainless **steel** is heavily **plastically deformed** by grinding or rolling, a **martensitic** phase transformation occurs that causes significant changes in the bulk and surface mech. properties of the **alloy**. This **martensitic** phase can also be **generated** in stainless-**steel** surfaces by cathodic charging, as a consequence of lattice strain **generated** by absorbed hydrogen. Heat treatment of the **steel** to temps. of several hundred degrees can result in loss of the **martensitic** structure, but this alters the bulk properties of the **alloy**. Here we show that **martensitic** structures in stainless **steel** can be removed by appropriate electrochem. treatment in aq. solns. at much **lower temp**. than conventional annealing treatments. This electrochem. induced annealing **process** allows the hardness of **cold-worked** stainless **steels** to be maintained, while eliminating the brittle **martensitic** phase from the surface. Using this approach, we are able to anneal the surface and near-surface regions of specimens that contain rolling-induced **martensite** throughout their bulk, as well as those contg. surface **martensite** induced by grinding. Although the origin of the electrochem. annealing **process** still needs further clarification, we expect that this treatment will lead to further development in enhancing the surface properties of **metals**.

CC 55-8 (Ferrous Metals and Alloys)

ST electrochem annealing stainless **steel** surface microhardness

IT Annealing
Heat treatment
Microhardness
Strain
(electrochem. induced annealing of stainless-**steel** surfaces)

IT 1333-74-0, Hydrogen, properties
RL: PRP (Properties)
(absorbed; electrochem. induced annealing of stainless-**steel** surfaces)

IT 12173-93-2, **Martensite**, properties

RL: FMU (Formation, unclassified); PRP (Properties); FORM (Formation, nonpreparative)
(electrochem. induced annealing of stainless-**steel** surfaces)

IT 12611-86-8
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(electrochem. induced annealing of stainless-**steel** surfaces)

L63 ANSWER 7 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1999:378883 Document No. 131:34114 New thermomechanical strategies for the **production** of high strength low **alloyed** multiphase **steel** showing a transformation induced plasticity (TRIP) effect. Eberle, Klaus; Cantinieaux, Pierre; Harlet, Philippe (Cockerill Sambre S.A., Liege, Belg.). Steel Research, 70(6), 233-238 (English) 1999. CODEN: STRSEY. ISSN: 0177-4832. Publisher: Verlag Stahleisen GmbH.

AB In the last years a lot of research was done in the development of TRIP-assisted multiphase **steels**. Two principal ways were proposed: (i) controlled **cooling** during the hot-rolling **process** to obtain hot-rolled TRIP-assisted multiphase **steels** and (ii) the combination of intercrit. annealing and isothermal holding at **bainite formation** temps. during continuous annealing resulting in **cold-rolled** TRIP-assisted **steel products**. Unfortunately both proposed thermomech. **methods** require a high silicon level to inhibit cementite pptn. in order to avoid a loss of stability for the metastable retained **austenite**. Din addn., due to high silicon levels, red scale surface defects and a moderate hot dip galvanizability appear. In this article, new thermomech. strategies for the **prodn**. of high strength low **alloyed** TRIP-assisted multiphase **steels** with good hot-dip galvanizability and without red scale defects will be presented. Regarding the thermomech. path, the stabilization of the retained **austenite** in the final microstructure can be optimized by the application of the addnl. step of batch annealing between hot **rolling** and **cold rolling**. This addnl. thermomech. step activates Mn diffusion in the **ferrite** matrix and Mn enrichment **processes** of the cementite. During the step of continuous annealing, the Mn enriched cementite is transformed into stabilization-optimized retained **austenite**. Regarding the final microstructure, a fine grained **ferrite** matrix of about 3 .mu.m grain size contg. small islands of intragranular and intergranular stabilization-optimized retained **austenite** can be obtained.

CC 55-5 (Ferrous Metals and Alloys)

ST thermomech multiphase **steel** phase transformation plasticity

IT Elongation, mechanical
Plastic deformation
Structural phase transition
Tensile strength
Yield strength
(thermomech. strategies for **prodn**. of high strength low **alloyed** multiphase **steel** showing transformation induced plasticity effect)

IT Metalworking
(thermomech. treatment; thermomech. strategies for **prodn**. of high strength low **alloyed** multiphase **steel** showing transformation induced plasticity effect)

IT 62388-18-5, **processes**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(thermomech. strategies for **prodn**. of high strength low

alloyed multiphase **steel** showing transformation
induced plasticity effect)

L63 ANSWER 8 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1999:3963 Document No. 130:113345 Effect of **plastic deformation** conditions on the structure and properties of an **Fe**-30% Ni **alloy**. Ciura, Franciszek; Rys, Janusz; Osuch, Wladyslaw; Kruk, Adam (Akad. Gorn.-Hutn., Krakow, Pol.). Dobor i Eksploatacja Materialow Inzynierskich, Krajowa Konferencja, Jurata, Pol., Sept. 22-25, 1997, 39-44. Editor(s): Glowacka, Maria; Smolenska, Hanna; Krzysztofowicz, Krzysztof. Wydzial Mechaniczny Politechniki Gdanskiej: Gdansk, Pol. (Polish) 1997. CODEN: 67DGAM.

AB Cross rolling at room temp. **produces** transgranular shear bands. Increasing the 2nd pass temp. to -30.degree. induces **martensitic** transformation. Thus obtained microstructure has better mech. properties than **martensite produced** by **quenching**.

CC 55-11 (Ferrous Metals and Alloys)

ST **iron alloy** nickel cross rolling **martensite**

IT **Cold rolling**
(cross **rolling** effect on the structure and properties of an **Fe**-30% Ni **alloy**)

IT 83667-12-3, Fe30Ni
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(cross rolling effect on the structure and properties of an **Fe** -30% Ni **alloy**)

IT 12173-93-2P, **Martensite, preparation**
RL: PNU (Preparation, unclassified); PRP (Properties); PREP (Preparation)
(cross rolling effect on the structure and properties of an **Fe** -30% Ni **alloy**)

L63 ANSWER 9 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1998:729835 Document No. 130:101867 The IGSCC behavior of L-grade stainless **steels** in 288.degree.C water. Angeliu, Thomas M.; Andresen, Peter L.; Pollick, Michael L.; Horn, Ronald; McCarthy, Veronica; Walmsley, John (GE Corporate Research and Development, Schenectady, NY, 12301, USA). Environmental Degradation of Materials in Nuclear Power Systems--Water Reactors, Proceedings of the International Symposium, 8th, Amelia Island, Fla., Aug. 10-14, 1997, Volume 2, 649-662. American Nuclear Society: La Grange Park, Ill. (English) 1997. CODEN: 66YVAT.

AB The intergranular stress corrosion crack (IGSCC) susceptibility of welded 304L and 316L SS was evaluated in 288.degree.C high purity water at .apprx.+200 mVSHE, representative of the BWR core environment. The resistance to IGSCC was evaluated using slow strain rate tensile (SSRT), const. load (CL) and bent beam (BB) techniques. The 316L SS is more resistant to IGSCC in all conditions evaluated by all test techniques. Test results show that the 304L SS materials exhibit IG fracture morphol. in the weld heat affected zone (HAZ) when aged between 450 and 550.degree.C for times up to 2000 h. The IG cracking is dependent on the corrosion potential and is sensitive to the surface condition. At +200 mVSHE, the 304L (0.008 wt.%C) material exhibits IGSCC, while not at +80 mVSHE. Removal of a **cold worked** surface layer contg. **deformation** induced **martensite** increased the strain to failure of 304L (0.008 wt.%C) SS. Double loop electrochem. potentiokinetic reactivation (DL-EPR) measurements indicate that the 304L SS specimens are slightly sensitized and **metallog**. examn. reveals grain boundary ppts. FEGSTEM anal. detd. that the grain boundaries of the 304L (0.008 wt.%C) are slightly Cr-depleted near (.apprx.50 nm) Cr-rich grain boundary ppts. FEGSTEM revealed P enrichment in 304L and 316L materials while Auger anal. revealed no discernible

differences between the grain boundary and bulk regions. SSRT expts. revealed no effects of segregated P or S on the IGSCC behavior of ultra-low carbon 304 SS. Addnl. expts. using BWR representative 304L SS are designed to sep. the effects of thermal aging and **cold work** which may be enhancing the IGSCC susceptibility by promoting Cr depletion through the sensitization of **deformation**-induced **martensite** and/or impurity segregation.

CC 71-4 (Nuclear Technology)
Section cross-reference(s): 55, 72

ST BWR **coolant** stainless **steel** intergranular stress corrosion cracking; L grade stainless **steel** intergranular stress corrosion cracking; reactor **coolant** stainless **steel** intergranular stress corrosion cracking; water intergranular stress corrosion cracking stainless **steel**

IT Fuel assemblies
Fuel assemblies
Nuclear reactor **cooling** systems
Nuclear reactor **cooling** systems
(BWR; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT Boiling water nuclear reactors
Boiling water nuclear reactors
(**cooling** systems; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT Electric potential
(corrosion; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT Boiling water nuclear reactors
Boiling water nuclear reactors
(fuel assemblies; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT Annealing
Cathodic polarization
Cooling water
Crack (fracture)
Crack initiation
Grain boundaries
Grain boundary segregation
Impurities
Microhardness
Plastic deformation
Precipitates
Reactor cores
Stress corrosion cracking
Stress-strain relationship
Thermal aging
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT Carbides
RL: OCU (Occurrence, unclassified); PEP (Physical, engineering or chemical process); OCCU (Occurrence); PROC (Process)
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT Corrosion

(intergranular; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT **Deformation** (mechanical)
(surface; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT 144-62-7, Oxalic acid, uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(etchant; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT 12173-93-2, **Martensite, processes**
RL: FMU (Formation, unclassified); PEP (Physical, engineering or chemical process); FORM (Formation, nonpreparative); PROC (Process)
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-21-3, Silicon, uses 7440-47-3, Chromium, uses 7704-34-9, Sulfur, uses 7723-14-0, Phosphorus, uses
RL: MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT 11130-49-7, Chromium carbide
RL: OCU (Occurrence, unclassified); PEP (Physical, engineering or chemical process); OCCU (Occurrence); PROC (Process)
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT **7439-89-6, Iron,** uses 11134-23-9 12611-86-8
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT 12597-69-2, **Steel, processes**
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(welded; intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

IT **7439-89-6, Iron,** uses
RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(intergranular stress corrosion crack behavior of L-grade stainless **steels** in 288.degree.C water representative of the BWR core environment)

L63 ANSWER 10 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1998:557290 Document No. 129:205539 Atomic redistribution of **alloying** elements in nanocrystalline **austenitic** chromium-nickel **steels** obtained by strong **plastic** **deformation**. Deryagin, A. I.; Zavalishin, V. A.; Sagaradze, V. V. (Ural Division, Institute of Metal Physics, Russian Academy of Sciences, Yekaterinburg, 620219, Russia). Nanostructured Materials, 10(3), 411-418 (English) 1998. CODEN: NMAEE7. ISSN: 0965-9773. Publisher: Elsevier Science Inc..

AB The fcc solid soln. of the stable **austenitic** 12Cr30Ni **steels** has exhibited segregation during heavy **cold-working** .psi.>80%, T=24, that gives rise to a ferromagnetic component with a Curie temp. close to 128.degree., which may be assocd. with a local increase in the nickel concn. to 40%. The redistribution of the **alloying** elements induced by **cold working** is attributed, by analogy with the **low-temp.** irradn., to the diffusion of the point defects **generated** by the **deformation**, to the sinks (grain or sub grain boundaries, phase interfaces, etc.) so that the sink regions have higher or lower concns. of elements with different at. radii. Changes that take place in the matrix during redistribution of the **alloying** elements are evaluated using the Moessbauer spectroscopy.

CC 55-8 (Ferrous Metals and Alloys)

ST atomic redistribution nanocryst chromium nickel **steel**; **plastic deformation** nanocryst chromium nickel **steel**

IT Diffusion
Ferromagnetic materials
Grain boundaries
Mossbauer spectroscopy
Plastic deformation
Point defects
Solid solutions
(at. redistribution of **alloying** elements in nanocryst. **austenitic** chromium-nickel **steels** obtained by strong **plastic deformation**)

IT Nanocrystalline **metals**
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(at. redistribution of **alloying** elements in nanocryst. **austenitic** chromium-nickel **steels** obtained by strong **plastic deformation**)

IT Molding
(cold-press; at. redistribution of **alloying** elements in nanocryst. **austenitic** chromium-nickel **steels** obtained by strong **plastic deformation**)

IT 11136-69-9, Chromium nickel **steel**, properties 150385-00-5, Kh12N30
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(at. redistribution of **alloying** elements in nanocryst. **austenitic** chromium-nickel **steels** obtained by strong **plastic deformation**)

L63 ANSWER 11 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1993:500657 Document No. 119:100657 The mechanical stability of **austenite** and cryogenic toughness of ferritic **iron** -manganese-aluminum **alloys**. Lee, Sang Woo; Lee, Hu Chul (Res. Inst. Ind. Sci. Technol., Pohang, 790-600, S. Korea). Metallurgical Transactions A: Physical Metallurgy and Materials Science, 24A(6), 1333-43 (English) 1993. CODEN: MTTABN. ISSN: 0360-2133.

AB To understand the role of retained **austenite** on the cryogenic toughness of a ferritic **Fe**-Mn-Al **steel**, the mech. stability of **austenite** during **cold rolling** at room temp. and **tensile deformation** at ambient and liq. nitrogen temp. was investigated, and the microstructure of strain-induced transformation **products** was obsd. by TEM. The vol. fraction of **austenite** increased with increasing tempering time and reached 54% after 650.degree., 1h tempering and 36% after

550.degree., 16h tempering. Satn. Charpy impact values at liq. nitrogen **temp**. increased with **decreasing** tempering **temp**
., from 105 J after 650.degree. tempering to 220 J after 550.degree. tempering. The room-temp. stability of **austenite** varied significantly according to the (.alpha. + .gamma.) region tempering temp.; i.e., in 650.degree. tempered specimens, 80 to 90% of **austenite** was transformed to lath **martensite**, while in 550.degree. tempered specimens, **austenite** remained untransformed after 50% cold redns. After tensile fracture (35% tensile strain) at -196.degree., no retained **austenite** was obsd. in 650.degree. tempered specimens, while 16% of **austenite** and 6% of .epsilon.- **martensite** were obsd. in 550.degree. tempered specimens. Considering the high vol. fractions and high mech. stability of **austenite**, the crack blunting model seems highly applicable for improved cryogenic toughness in 550.degree. tempered **steel**. Other possible toughening mechanisms were also discussed.

CC 55-12 (Ferrous Metals and Alloys)

ST **iron** manganese aluminum **austenite** stability; toughness cryogenic **iron** manganese aluminum; **cold rolling iron** manganese aluminum; **martensite iron** manganese aluminum tempering

IT Tempering
(of **iron**-manganese-aluminum **alloys**, cryogenic toughness in relation to)

IT Metalworking
(**cold rolling**, of **iron**-manganese-aluminum **alloys**, mech. stability of **austenite** in relation to)

IT 149345-76-6, Aluminum 2.7, **iron** 84, manganese 13, molybdenum 0.3, silicon 0.1
RL: PRP (Properties)
(mech. stability of **austenite** and cryogenic toughness of)

IT 12173-93-2, **Martensite**, properties 12244-31-4, **Austenite**, properties
RL: PRP (Properties)
(transformation of, in **iron**-manganese-aluminum **alloys**
)

L63 ANSWER 12 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1991:433420 Document No. 115:33420 **Manufacture** of **cold-rolled steel** strip for automobile body panels.
Shirasawa, Hidenori; Tanaka, Fukuteru; Miyoshi, Tetsuji (Kobe Steel, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 02185929 A2 19900720 Heisei, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1989-4438 19890111.

AB High-strength strip is **manufd.** from **ingot** slab of **steel** contg. C 0.10-0.25, Si .ltoreq.0.4, Mn 1.0-2.5, S .ltoreq.0.010, and Al 0.01-0.05%. Hot-rolled slab is finished at .gtoreq.800.degree., and the strip is coiled at .ltoreq.600.degree., **quenched** at 15-60.degree./s to give **bainite-ferrite** structure, pickled in an acid bath, **cold rolled** and continuously annealed at 850.degree. for 5-15% polygonal **ferrite** in the **martensite** microstructure. The reheated strip is hardened by **quenching** in water, and reheated at 300-500.degree. for 30-300 s for tempering to promote local **deformability** and **tensile** strength .gtoreq.100 kg/mm2. Thus, the slab 30 mm thick (contg. C 0.13, Si 0.25, Mn 2.03, P 0.010, S 0.003, Al 0.026, and N 0.0034%) was hot rolled at 1200.degree. with finishing at 850.degree., and the strip 3.2 mm thick was coiled at 500.degree., **quenched** at 30.degree./s, pickled in HCl bath, and **cold rolled** at 50% draft. The strip was then annealed for 8% polygonal **ferrite** in the **martensite** structure,

reheated at 400.degree. for 180 s, and **quenched** at 15.degree./s, resulting in tensile strength of 118 kg/mm2, yield point 101 kg/mm2, and elongation 62%, vs. 96 kg/mm2, 73 kg/mm2, and 41% resp. for a conventional **steel**.
IC ICM C21D009-46
ICS C21D008-04; C22C038-00; C22C038-06
CC 55-11 (Ferrous Metals and Alloys)
ST manganese **steel** strip tempering **martensite**; automobile **steel** strip tempering
IT 108365-04-4, properties 134784-04-6, properties
RL: PRP (Properties)
(strip **manuf**. from, continuous annealing in, for strength and formability)

L63 ANSWER 13 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1989:80397 Document No. 110:80397 Heat treatment of rolled strip. Pirogov, V. A.; Martsiniv, B. F.; Vakulenko, I. A. (Institute of Ferrous Metallurgy, Dnepropetrovsk, USSR). U.S.S.R. SU 1421781 A1 19880907 From: Otkrytiya, Izobret. 1988, (33), 103. (Russian). CODEN: URXXAF. APPLICATION: SU 1986-4204160 19861212.
AB The strip from low-C or low-**alloy steels** is heated at a controlled rate to a temp. above Ac3, **austenitized, cooled** to a temp. below Ar1 and held, and then **cooled** at an accelerated rate. Strength and plasticity are increased when the **austenitized** strip is **cooled** to 550-710.degree. at 20-1500.degree./s, held for 5-600 s, and then **cooled** at a controlled rate. The initial strip is optionally **cold-rolled** with 20-60% redn., heated at 20-300.degree./s to the **austenitizing** temp., and hot-rolled for **plastic deformation** prior to the **cooling** to 550-710.degree..
IC ICM C21D008-00
CC 55-5 (Ferrous Metals and Alloys)
ST **steel** strip heat treatment strength
IT **Process** control and dynamics
(of heat treatment, of **steel** strip)
IT 12597-69-2, **Steel**, uses and miscellaneous
RL: USES (Uses)
(heat treatment of, strip **austenitizing** and **cooling** in)

L63 ANSWER 14 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1987:481877 Document No. 107:81877 Effect of **plastic deformation** degree and subsequent aging on the mechanical properties and fracture of **austenitic alloy**.
Krasavin, D. L.; Sukhovarov, V. F.; Strokatov, R. D. (Inst. Fiz. Prochn. Materialoved., Tomsk, USSR). Fizika Metallov i Metallovedenie, 63(6), 1207-11 (Russian) 1987. CODEN: FMMTAK. ISSN: 0015-3230.
AB The effect of **cold rolling** and aging at 600.degree. for 4 h on tensile and fatigue properties of 36NKhTYu is described. The rolling redn. >30% slightly increases the fatigue limit (107 cycles), decreases the crack resistance, and has no further effect on ductility of the **quenched alloy**. The fatigue limit of the aged **alloy** has a max. at 50-70% redn. The decrease in fatigue limit and ductility and the increase in tensile and yield strengths of the aged **alloy** are due to the **formation** of an ultrafine structure of discontinuous ppts. of the .gamma.'-phase.
CC 55-12 (Ferrous Metals and Alloys)
ST **austenitic alloy deformation** aging property; pptn hardening stainless **steel** property
IT 37301-95-4, 36NKhTYu

RL: PRP (Properties)
(mech. properties of, **plastic deformation** and aging effect on)

L63 ANSWER 15 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1987:71174 Document No. 106:71174 Hard nonmagnetic shafts having good corrosion resistance. Kanai, Yoshiaki (Sanwa Needle Bearing Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 61130459 A2 19860618 Showa, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1984-251909 19841130.

AB The shafts are **manufd.** from **steels** contg. C 0.10-0.50, Si .ltoreq.0.60, Mn 14-20, Ni 0.3-2.0, Cr 16-18, and N 0.04-0.4%. After hot rolling at 1000-1050.degree. and **quenching** at .gtoreq.15.degree./s, a **cold** rod is **drawn,** sheared, and **compressed** by rolling. Surface Vickers hardness is .gtoreq.500 and magnetic permeability .ltoreq.1.01. The nonmagnetic shafts have a stabilized **austenitic** microstructure with good corrosion resistance due to high Cr content, and are useful for app. such as video tape recorders or video cameras. Thus, **Fe-alloy ingot** (contg. C 0.19, Si 0.28, Mn 14.78, Ni 1.50, Cr 17.40, and N 0.35%) was hot-rolled with **quenching** into a rod of 5.5 mm diam. The rod was **cold drawn** to diam. 2.72 mm, sheared, and **plastically deformed** by **rolling** for **cold compression** to **manuf**. a shaft of diam. 2.6 mm. The shaft had tensile strength 212.8 kg/mm2, surface Vickers hardness 536, magnetic permeability 1.002, and no rust **formation** in a humid atm. at 60.degree., vs. 190.0 kg/mm2, 560, 1.008, and rust **formation** for a conventional **Fe-alloy** shaft contg. C 0.46, Si 0.34, Mn 19.23, Ni 0.07, and Cr 5.29%.

IC ICM C22C038-40
ICS C21D008-06; G11B005-52; G11B015-28; G11B015-60; G11B023-087

CC 55-3 (Ferrous Metals and Alloys)

ST nonmagnetic **iron alloy** shaft; **iron** chromium manganese **alloy** nonmagnetic

IT Shafts
(nonmagnetic, **iron**-chromium-manganese **alloy** for)

L63 ANSWER 16 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1984:72158 Document No. 100:72158 Immunization of type 304 stainless **steels** to intergranular corrosion by thermomechanical treatment. Kiuchi, Kiyoshi; Kondo, Tatsuo (Tokai Res. Establ., Japan At. Energy Res. Inst., Tokai, 319-11, Japan). Tetsu to Hagane, 70(1), 112-19 (Japanese) 1984. CODEN: TEHAA2. ISSN: 0371-6279.

AB Simple and practical countermeasures to intergranular corrision of com. heats of SUS 304 stainless **steels** [11109-50-5] were developed by utilizing the microstructural features of the material aged after **plastic deformation** without modifying **alloy** compn. In this **method,** the **manufg. process** was modified by full soln. treatment and subsequent **cold working** and aging as the carbide pptn. temp. and then by heating to recrystn. at **temps.** of the levels **low** enough so that no carbide redissoln. takes place. In contrast to the traditional mill annealing **process,** the thermomech. treated **steel** showed satisfactory protection against intergranular corrosion. A typical structure obtained by this **process** is assocd. with fine grain size and evenly dispersed fine spherical M23C6 carbide particles. In addn., the material showed improved tensile properties due to the Hall-Petch effect with the refined grain size and the fine carbide dispersion.

CC 55-10 (Ferrous Metals and Alloys)

ST corrosion **austenite** stainless **steel;** thermomech
austenite stainless **steel** corrosion
IT 11109-50-5
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(corrosion of **austenitic**, thermomech. treatment for control
of intergranular)

L63 ANSWER 17 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1980:219108 Document No. 92:219108 Elastic and plastic strains and the stress corrosion cracking of **austenitic** stainless **steels**
. Vaccaro, F. P.; Hehemann, R. F.; Troiano, A. R. (Dep. Metall. Mater. Sci., Case West. Reserve Univ., Cleveland, OH, USA). Report, COO-2576-9, 133 pp. Avail. NTIS From: Energy Res. Abstr. 1979, 4(24), Abstr. No. 56918 (English) 1979.
AB The influence of elastic (stress) and plastic (**cold work**
) strains on the stress corrosion cracking of a transformable **austenitic** stainless **steel** [12597-68-1] was studied in several aq. chloride environments. Initial polarization was active for all **deformation** conditions and for the annealed state. Visual observation, potential-time, and current-time curves indicated the development of a pseudo-passive (flawed) film leading to localized corrosion, occluded cells, and SCC. SCC did not initiate during active corrosion regardless of the state of strain unless severe **low-temp. deformation produced** a high percentage of **martensite** [12173-93-2]. Both elastic and **plastic deformation** increased the sensitivity to SCC when examd. on the basis of percent yield strength. The corrosion potential, the crit. cracking potential, and the potential at which the current changes from anodic to cathodic were essentially unaffected by **deformation.**
The basic electrochem. parameters are independent of the bulk properties of the **alloy** and totally controlled by surface phenomena.
CC 55-9 (Ferrous Metals and Alloys)
ST stress corrosion stainless **steel; austenitic** stainless
steel corrosion
IT 12173-93-2P, **preparation**
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(**formation** of, in **deformation** of **austenitic**
stainless **steel,** stress corrosion cracking in relation to)
IT 12597-68-1, reactions
RL: RCT (Reactant)
(stress corrosion of **austenitic**, elastic and plastic strains
in)

L63 ANSWER 18 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1978:463179 Document No. 89:63179 Effect of the starting structure on the strengthening and properties of strips **made** from the **alloy** 36NKhTYu. Vorontsov, N. M.; Shugaenko, V. K.; Drapiko, P. E.; Chernyakova, L. E.; Patseka, R. F. (Ukr. Nauchno-Issled. Inst. Met., Kharkov, USSR). Metalloved. Term. Obrab. Met. (5), 39-44 (Russian) 1978. CODEN: MTOMAX. ISSN: 0026-0819.
AB The effect of the initial structure was studied on strengthening of strips from the dispersion-hardened spring **steel** 36NKhTYu [37301-95-4] contg. **Fe** 47.068, Ni 35.3, Cr 12.4, Ti 2.84, Mn 1.03, P 0.013, S 0.009, Al 0.99, Si 0.32, and C 0.03%. **Cold rolling** resulted in the **deformation** and refining of the **austenite** [12244-31-4] grains accompanied by twinning at **deformation** degrees >40%. Strengthening resulted from the increase in the dislocation d. to 1011/cm during cold **plastic deformation**. Thus, after **quenching** from 1100.degree. and 20% cold **plastic deformation** the **tensile**

strength was 110, yield strength 108 kg/mm2, and elongation 3%. Work hardening of thin strips during rolling caused significant strengthening after aging and elimination of surface defects.
CC 55-8 (Ferrous Metals and Alloys)
ST **iron** nickel spring strengthening
IT Springs (mechanical)
(**steel**, strengthening of dispersion-hardened, structure effect on)
IT 12244-31-4, properties
RL: PRP (Properties)
(grain size refining of, in dispersion-hardened spring **steel**, strengthening by)

L63 ANSWER 19 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1977:604884 Document No. 87:204884 Changes in the yield point of **austenite** during **martensite** transformation. Blanter, M. E.; Sobiev, A. S. (Vses. Zaochn. Mashinostroit. Inst., Moscow, USSR). Metalloved. Term. Obrab. Met. (6), 7-10 (Russian) 1977. CODEN: MTOMAX.
AB The .gamma. .fwdarw. .alpha. transformation-induced variations in the 0.2%-offset yield strength .sigma.0.2 of N28G1.5 [64685-56-9] were evaluated from the amplitude-dependence of internal friction Q-1(.gamma.). The **alloy** hot-**worked** and **cold-drawn** into wire specimens 1 mm in diam. was **austenitized** at 1000.degree. and water-**quenched**. During its **cooling** to -196.degree. .apprx.58% **martensite** [12173-93-2] **formed**. The Q-1(.gamma.) curve was characterized by a break at some crit. amplitude, .gamma.c. At prestrains .epsilon. > .epsilon.c irreversible changes assocd. with **plastic deformation** occurred. The wire samples were **cooled** to various temps. to obtain 8-58% **martensite** and for each **martensite** amt., M, the corresponding .sigma.0.2 of the **austenite** [12244-31-4] were calcd. Over the M .ltoreq. 15% range, .sigma.0.2 of the **austenite** was quasi-independent of M, but at higher **martensite** contents it increased sharply from 10 to 40 kg/mm2 at a transformation degree of 58%.
CC 55-7 (Ferrous Metals and Alloys)
ST **austenite** yield strength transformation; nickel manganese **steel** transformation
IT 12173-93-2P, **preparation**
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(**formation** of, in nickel-manganese **steel**, yield strength in relation to)
IT 64685-56-9
RL: PRP (Properties)
(yield strength of, during **martensitic** transformation)
IT 12244-31-4, properties
RL: PRP (Properties)
(yield strength of, in nickel-manganese **steel** during transformation)

L63 ANSWER 20 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1976:497498 Document No. 85:97498 Some features of the precipitation of carbides in **deformed austenitic steels**.
Smirnov, M. A.; Bulanov, Yu. P.; Kuznetsova, G. V. (Ural. Filial, Vses. Teplotekh. Inst. im. Dzerzhinskogo, Sverdlovsk, USSR). Fiz. Met. Metalloved., 41(2), 397-401 (Russian) 1976. CODEN: FMMTAK.
AB The effect was examd. of preliminary **plastic deformation** at 20 and 1000.degree. on the phase compn. of carbides pptd. during subsequent aging. As initial materials, the **austenitic steels** 4Kh14N14V2M [37350-04-2] and 4Kh15N7G7F2MS [12746-60-0]

pptn.-hardened by M23C6- and M23C6- plus MC-type **metal** carbides, resp., were selected. The specimens water-**quenched** from 1180.degree. were **cold rolled** to 30% redn. and then **quenched**. After aging 8 hr at 600-900.degree., the undeformed and **deformed** specimens were electrolytically dissolved and the anode residue was examd. by chem. and x-ray anal. Cold **plastic deformation** affects the degree of **alloying** of M23C6, which has a wide homogeneity region and seems to have no effect on the phase compn. of MC characterized by strong bonds of V and C atoms. It also accelerates the dissoln. of metastable carbides during aging. Analogous phenomena were obsd. after hot **deformation**, but the overall effect was less pronounced, probably owing to a lower d. of structural defects **formed** during rolling at elevated temps.

CC 55-7 (Ferrous Metals and Alloys)

ST carbide pptn **austenitic** stainless; stainless **steel** carbide pptn

IT 12746-60-0 37350-04-2
RL: USES (Uses)
(carbide pptn. in **deformed**, effect of **plastic deformation** on)

L63 ANSWER 21 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1974:539229 Document No. 81:139229 Effect of **plastic deformation** on the **martensite-austenite** transformation in two **iron**-nickel-carbon **alloys**.
Durlu, T. N.; Christian, J. W. (Dep. Metall., Oxford Univ., Oxford, Engl.). Metal Sci., 8(1), 1-4 (English) 1974. CODEN: METSC7.

AB **Metallog.** observations and measurements of elec. resistivity showed that the **martensite** .fwdarw. **austenite** transformation on heating is progressively retarded by prior **martensite deformation**. At the heating rates used, the transformation is not **martenistic**, but may occur by inward displacement of parts of the existing **austenitic-martensite** interfaces. Two **alloy steels** contg. Ni 24.0 and 26.4, C 0.45 and 0.24, and Si 0.07 and 0.08% in the **form** of 10-kg **ingots** were **made** into sheet specimens by machining and **cold-rolling**; some **compression** samples were also **prepd**. by spark-machining. All the specimens are vacuum-annealed for 6 hr at 1200.degree., then furnace-**cooled**, giving a completely **austenitic** structure. **Martensite** was **formed** by subzero **cooling**; the vol. fraction was controlled by the temp. to which the sample was **cooled**.

CC 55-7 (Ferrous Metals and Alloys)

ST **plastic deformation martensite austenite** transformation; nickel **steel martensite austenite**

IT 12244-31-4P, **preparation**
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(**formation** of, in **iron**-nickel **alloys**, **plastic deformation** effect on)

IT 54425-45-5 54425-46-6
RL: USES (Uses)
(**martensitic** transformation in, **plastic deformation** effect on)

IT 12173-93-2
RL: USES (Uses)
(transformation of, in **iron**-nickel **alloys**, **plastic deformation** effect on)

L63 ANSWER 22 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1974:524884 Document No. 81:124884 Possible **preparation** of natural composites with **ferrite**-cementite structures. Kidin, I. N.; Lizunov, V. I.; Belyavskaya, V. M. (Mosk. Inst. Stali Splavov, Moscow, USSR). Metalloved. Term. Obrab. Metal. (4), 25-7 (Russian) 1974. CODEN: MTOMAX.

AB To obtain fibrous composite, high-C hypoeutectoid **steel** St.60 was rapidly heated to temps. below the homogeneity region of **austenite**, hot-**deformed** by .epsilon. = 40%, and **cold-rolled**. During rapid electroheating the zones of increased C concn. arepreserved at the sites of initial cementite lamellas which combined with the hot **plastic deformation** leads to a high d. of structural imperfections oriented in the direction of **deformation**. The presence of these zones facilitates the directed pptn. of cementite during subsequent eutectoid decompn. resulted in oriented fiber-like structures in the ferritic matrix. The misorientation of cementite fibers did not exceed 5-15.degree.. For St.60 with tensile strength .sigma.b = 60 kg/mm2 the crit. L/D ratio, where L and D are the length and diam. of cementite fibers, resp., required for an adequate strengthening of the matrix is .apprx.13.5, but smaller ratios of 3-10 were found. Hence to attain a better strengthening by the cementite fibers the ratio had to be increased by **cold-rolling** by .epsilon. = 20-83%. A comparison of the mech. properties of conventionally treated St.60 (**quenching** plus **low-temp.** tempering for .sigma.b = 170-80 kg/mm2 and an area redn., .psi., of 5-20%) and the composite **alloy** with oriented cementite fibers was in favor of the latter with .sigma.b = 260-70 kg/mm2 and .psi. = 56% after cold **deformation** by .epsilon. = 83%.

CC 55-7 (Ferrous Metals and Alloys)

ST cementite fiber **ferrite** composite; carbon hypoeutectoid **steel** strengthening

IT 12169-32-3 12427-24-6
RL: PRP (Properties)
(orientation of, in hypoeutectoid **steel** for strengthening, thermomech. treatment for)

L63 ANSWER 23 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1974:453021 Document No. 81:53021 Kinetics of **martensite formation** in **iron**-chromium-nickel **alloys** during **cooling** and **plastic deformation**. Koryagin, Yu. D.; Zhuravlev, L. G.; Shteinberg, M. M.; Golikova, V. V.; Povolotskii, V. D. (USSR). Sb. Nauch. Tr., Chelyabinsk. Politekh. Inst., No. 107 151-6 From: Ref. Zh., Met. 1973, Abstr. No. 4I122 (Russian) 1972.

AB **Alloy steels** contg. C .ltoreq. 0.07, Cr 13.2-14.8, Ni 10.2-11.6, and Al, Si, Mn, Mo, W, and Nb 0.2-4% were studied. The extension of all specimens was conducted at **martensite** satn. and **deformation** temps. so that the effects of **cooling** of **martensite** on kinetics of the .alpha. .fwdarw. .gamma. transformation during **plastic deformation** were eliminated. **Plastic deformation** resulted in an intensive **martensite** transformation; the amt. of **martensite** was >40-50% even in those **alloys**, in which **austenite** was retained during **cooling** to -196.degree.. Mn, Si, and Nb promoted the **formation** of **deformation martensite**, while Al had no effect on this phenomenon. The effects of preliminary **plastic deformation** at 20 and 250.degree. on **martensite formation** during subsequent **cooling** were studied. Specimens were **cooled** in N after **deformation** in a magnetometer and magnetometric curves were traced. **Working** (**cold**-hardening) stabilized the

austenite in Cr-Ni-Al **alloy** Kh14N10Yu0.5 and Cr-Ni-Si **alloy** Kh14N10S0.7 during the subsequent **martensite** transformation. After 1 cycle of cold-hardening, the **martensite** transformations in the 2 **alloys** decreased by .apprx.58 and 62%, resp.
CC 55-7 (Ferrous Metals and Alloys)
ST **martensite formation alloy steel;** chromium nickel **steel martensite**
IT 12173-93-2P
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(**formation** of, in stainless **steel**, cold-hardening and **plastic deformation** effect on kinetics of)
IT 53489-56-8 53528-03-3 53528-04-4
RL: USES (Uses)
(**martensite formation** in, **plastic deformation** effect on kinetics of)
IT 12244-31-4, properties
RL: PRP (Properties)
(stability of, in stainless **steel**, kinetics of **martensite formation** in relation to)

1973:422270 Document No. 79:22270 Mechanical-technological investigations of **austenitic alloy steels** and their manual arc-welded seams of the same kind of material with regard to shipbuilding. Steffens, Hans Dieter; Staskewitsch, Ewald (Arbeitsgruppe Angew. Materialforsch., Bremen-Lesum, Ger.). Schweissen Schneiden, 24(5), 168-71 (German) 1972. CODEN: SCSCA4.
AB A study was **made** of the creep of 2 welded ship **steels** X2CrNiMnMoN 1913 and X2CrNiMnMoN 1916 at room temp. and of the effects of heat treatment and cold redn. on the mech. properties of welded **austenitic** ship **steel**. The 2% creep limit decreased approx. proportionally to the log of the time and was 367 N/mm2 for 100 min loading, 353 N/mm2 for 1000 min, and 341 N/mm2 for 10,000 min. **Cold working** had a strengthening effect and a 2% cold redn. increased the 0.2% limit by .apprx.30%. The increase was less with greater cold redn. Air-**cooled** samples were elastic up to .apprx.80% of the 0.2% limit and then showed highly **plastic deformation** with only a little strengthening. Water-**quenched** samples showed considerable strengthening. The weld **metal** obtained by manual arc welding was free of defects. The electrode was **made** of the same **steel**. The 0.2% limits of the weld **metal** were slightly higher than those of the base **metal**. The notch-impact toughness decreased linearly with **deformation**. The creep of the weld **metal** was more pronounced than that of the base **metal**. At const. stress, creep decreased with increasing cold redn.
CC 55-8 (Ferrous Metals and Alloys)
ST **austenite alloy steel** weld; creep welded ship **steel;** heat treatment welded **steel;** cold redn **austenite steel**
IT Ships
(**austenitic steel** welds in, creep of)
IT Welds
(**steel** ship **austenitic**, creep of)

1972:437896 Document No. 77:37896 Cold **plastic deformation** effect of **martensite** in 12% chromium **steel** on the mechanism of tempering. Hubert, Hilda (Inst. Politeh., Bucharest, Rom.).

Stud. Cercet. Met., 16(2), 179-92 (Romanian) 1971. CODEN: SCMLAZ.
AB Electron microscopy and x-ray diffraction **methods** were used to study the decompn. of **cold-rolled martensite** as a function of the extent of **plastic deformation** during heating from 100 to 670.degree. for a **steel** sample contg. Cr 12 and C 0.1%. There is an increased dispersion of carbide particles to give a greater d. and more uniform distribution. The rate and extent of **martensite** decompn. and the sepn. of **alloyed** carbides increase at **lower temps**. and the tempering rate increases. During tempering polygonization develops in the ferritic matrix, which implies a decrease of dislocation d. and 2nd-order stresses together with an increased size of mosaic blocks.
CC 55-7 (Ferrous Metals and Alloys)
ST **martensite** chromium tempering **deformation**
IT 12173-93-2
RL: USES (Uses)
(**plastic deformation** effect on, in tempering of chromium **steel**)
IT 37192-61-3
RL: USES (Uses)
(tempering of, cold **plastic deformation** effect on **martensite** in)

L63 ANSWER 26 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1971:408898 Document No. 75:8898 Effect of **alloying, cold** hardening, and **work** hardening on an "explosive" **martensite** transformation in **iron**-nickel-carbon-based **alloys**. Zhuravlev, L. G.; Shcherbakova, A. F.; Shteinberg, M. M.; Gol'diner, M. G.; Kondratenko, E. A. (Chelyabinsk. Politekh. Inst., Chelyabinsk, USSR). Fiz. Metal. Metalloved., 31(2), 431-3 (Russian) 1971. CODEN: FMMTAK.
AB The transformation of **austenite** into **martensite** in **alloys** with a **martensitic** point below room temp. can have different kinetics. The instantaneous **formation** of a large amt. of **martensite**, called "explosion transformation," is possible in **alloys** with high Ni or C contents. In **alloys** (0.25-0.35% C and 24-26% Ni), **alloyed** by 0.2-3% Si, Mo, Mn, or Cr, the **martensitic** transformation in most cases was explosive and explosions occurred several times during **decrease** in **temp**. In one sample of **alloy**, contg. 0.85% Mo, the transformation began smoothly and .apprx.6% of the **martensite** was **formed** before the 1st explosion. However, the transformation, usually began smoothly and .ltoreq.25% **martensite** was **formed** before explosion, which was often a single one, after **alloying** by Ti. The effect of phase hardening was studied in samples heated to 1150.degree., **cooled** in liq. N for **martensitic production**, heated in a dilatometer furnace to 10-15.degree. higher than the termination of the reverse .alpha.-.gamma. transformation, and then **cooled** in a magnetometer. The 1st cycle of .gamma. .fwdarw. .alpha. .fwdarw. .gamma. transformation almost entirely suppressed the explosive **martensitic** transformation in all **alloys**. The effect of **plastic deformation** was similar to that of phase hardening with 1 cycle of phase hardening about equiv. to **tensile deformation** by 25-30%. These effects of **plastic deformation** and phase hardening are evidently caused by an increase in the d. of defects of the crystal structure and their distribution in the **austenitic** matrix.
CC 55 (Ferrous Metals and Alloys)
ST explosive **martensitic** transformation **iron**

alloys; molybdenum **iron alloys** explosive transformation; silicon **iron alloys** explosive transformation; manganese **iron alloys** explosive transformation; chromium **iron alloys** explosive transformation; nickel **iron alloys** explosive transformation; carbon **iron alloys** explosive transformation; **quenching iron alloys** explosive transformation; hardening **iron alloys** explosive transformation; **deformation iron alloys** explosive transformation

IT Nickel **alloys**, containing
(**iron-**, **martensitic** transformation in, explosive)

IT **Iron alloys**, base
(nickel-, **martensitic** transformation in, explosive)

L63 ANSWER 27 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1969:527622 Document No. 71:127622 Effect of **plastic deformation** and tempering on the modulus of elasticity of **martensitic**-aging **steels**. Zubov, V. Ya.; Zlatkina, A. S.; Grachev, S. V.; Chervinskii, V. F. (Ural. Politekh. Inst. im. Kirova, Sverdlovsk, USSR). Fiz. Metal. Metalloved., 28(1), 160-5 (Russian) 1969. CODEN: FMMTAK.

AB To establish whether the max. hardening of **martensitic** aging **steels** corresponds to the sepn. of hardening intermetallic phases or to a redistribution of **alloying** elements in the solid soln., Young's modulus of several **steels** was detd. as a function of heating and **cooling** regime. The **steels** were hot **rolled** and **cold drawn** to obtain wire specimens 5 mm. in diam. which were either **quenched** from 815.degree. or cold-strained to attain 60% **deformation**. Mo, not exceeding 3%, increases E and the same effect is found when **alloying** with up to 4.2% Co. Joint **alloying** with Mo and Co maintains a const. value of E. The applied cold **deformation** (60%) decreases Young's modulus by 6% due to the appearance of crystal lattice defects. The strength properties and Young's modulus attain their max. values in a definite interval of tempering temps. (400-600.degree.), but the plastic properties of the **steel** are at a min. in the same interval. The changes in E are more pronounced with **cold drawn** samples as the aging **processes** are accelerated with preliminarily **deformed alloys**. The interval of optimal mech. properties corresponds to the initial period of aging when highly-dispersed intermetallic sepns. coherently bound to the matrix appear, while Young's modulus increases also during the period of subsequent over-aging. The continuous diffusion of **alloying** elements from the solid soln. to coarsening particles of intermetallides probably contributes to an addnl. relief of **deformation**-induced stresses. X-ray investigations show that a prolonged tempering at 500.degree. leads to the **formation** of 3-5% residual **austenite**. When the temp. is raised to 600.degree., this amt. reaches 30%. This residual **austenite** provokes an abrupt drop in the limit of elasticity and hardness but it increases E to its max. value. When heating specimens in the 2-phase region, the .alpha. .fwdarw. .gamma. transition leads to an accelerated decrease in E of the heterogeneous mixt. in spite of the appearance of Ni-**Fe austenite**. During **cooling** from higher temps. corresponding to the monophase region of the .gamma.-solid soln., E changes abruptly in the region of the **martensitic** transformation attaining practically its initial value. During an isothermal heating at 440, 485, and 585.degree. of **deformed** and preliminary aged samples, a sharp initial drop in E is found. After a few min., E increases intensively, attaining after 25

min., the 2nd stage of slow linear rise.
CC 55 (Ferrous Metals and Alloys)
ST **plastic deformation** elasticity **steels;**
deformations elasticity **martensitic steels;**
aging elasticity **martensitic steels;** tempering
elasticity **martensitic steels;** elasticity
martensitic aging **steels; steels**
martensitic aging elasticity
IT 12597-69-2, **Steel**, properties
(elasticity of cobalt-nickel maraging, molybdenum effect on)
IT 12244-31-4P, **preparation**
RL: PREP (Preparation)
(**formation** of residual, in maraging **steels**)

L63 ANSWER 28 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1969:80207 Document No. 70:80207 Hardening and **alloying** of **austenitic steels** and **alloys**. Shteinberg, M. M.; Zhuravlev, L. G.; Gonchar, V. N.; Farofonov, V. K.; Trifonov, G. A.; Smirnov, M. A.; Ibragimov, Kh. M.; Golikova, V. V. (Chelyabinsk. Politekh. Inst., Chelyabinsk, USSR). Dokl. Konf. Nauch. Rab., Sekts. Mashinostr., Podsekts. Metalloved., Chelyabinsk, 3-23. Editor(s): Shteinberg, M. M.. Chelyabinsk. Politekh. Inst.: Chelyabinsk, USSR. (Russian) 1967. CODEN: 20DAAF.
AB The effect of **alloying** elements on **austenitic steels** was studied on Cr-Ni **austenite** contg. Cr 14.5-15.5, Ni 12.5-13.0, and C 0.07-0.08 wt. %. This compn. was so calcd. that after **alloying** with Mo, W, V, Ti, Nb, and Si (1.5-3.5%) the hardened **alloys** would retain the **austenitic** structure. The effect of rare earth elements (La, Nd, Pr, and Cs) introduced into the ladle was also studied. Long-range strength was detd. after **plastic deformation** at 200.degree. to 80% redn. After **deformation**, specimens were held for 1 hr. at 550-900.degree. (at 50.degree. intervals) then **quenched** in water from 1150.degree. and tempered for 12 hrs. at 700.degree.. The treated specimens were subjected to long-range strength and creep tests under a stress of 14 kg./mm.2 at 650.degree.. The effect of temp. of **plastic deformation** on the structure and properties of **austenitic steels** was studied with **steels** EI-481 and EI-612K, which were **deformed** at 20-1100.degree. at the rate of 15 m./min. and at a redn. of 10-15 and 25-30%. The hardening of **austenitic steels** by way of phase (**cold-work**) hardening was studied with Mn contg. **steels** having C .ltoreq. 0.08% (various Mn concns.) Some specimens were addnl. **alloyed** with Si, Ni, Cr, Mo, and W. The phase-transition, .gamma.-.epsilon., has a considerable hardening effect, which was quite stable thermally. The study on simultaneous hardening of **austenitic steels** by phase **cold-work** hardening and by aging was **made** with a **Fe**-Ni **alloy** contg. 28% Ni and <0.08% C. This **alloy** had its **martensitic** point close to room temp. As addnl. **alloying** elements the following were added: Si, Al, Mn, Mo, C, W, and Nb in amts. from few tenths to 2-4 wt. %. All **alloying** elements showed increasing effect on the **martensitic** point up to the concn. 1.5-2.0%, while at higher concns. this effect decreased in intensity. The effect of thermal work hardening on the increase of hardness (strength) and heat resistance of **austenitic steels** was studied with **steels** Kh18N9, and Kh18N10T contg. C 0.06%. Some expts. were carried out with pure Ni, **alloy** EI-481 and some other **alloys**. Forged specimens were annealed for 2 hrs. at 1000.degree. and for 10 hrs. at 800.degree. and **cooled** slowly. Thermal hardening was

accomplished by heating specimens to various temps. within the range 400-1000.degree. and then slowly **cooling**. With large specimens the optimal thermal work-hardening could be achieved at relatively slow heating rates and **low temps**. Thermal work hardening can be used as a **method** of increasing the heat resistance of **austenitic steels**, provided the **plastic deformation** will proceed within a certain detd. temp. range.

CC 55 (Ferrous Metals and Alloys)

ST hardening **austenitic steels; austenitic steels** hardening; **steels austenitic** hardening

IT Rare earth **metals**, properties
RL: PRP (Properties)
(hardening of stainless **steel** in relation to)

IT **Steel**, stainless, uses and miscellaneous
(hardening of, aluminum effect on)

IT 7439-91-0, properties 7440-00-8, properties 7440-10-0, properties 7440-46-2, uses and miscellaneous
RL: PRP (Properties)
(hardening of stainless **steel** in relation to)

L63 ANSWER 29 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1968:42566 Document No. 68:42566 Effect of **alloying** on the softening and high-temperature strength of chromium-nickel **austenitic steels**. Farafonov, V. K.; Shteinberg, M. M.; Tret'yakova, E. G.; Dolgal, T. V.; Eremeeva, N. M. Proizvod. Krupnykh Mash., No. 13, 128-44 (Russian) 1966. CODEN: PKMTAE.

AB The effect of some **alloying** elements (Mo, W, V, Nb, Ti, Si, and Al) on the softening and high-temp. strength of Cr-Ni **austenitic steel** was investigated. The chem. compn. of **steel** Kh14N13 (Cr 14.5-15.5, Ni 12.5-13.0, and C 0.07-0.08%) was so chosen to preserve the initial **austenitic** structure during subsequent **alloying**. Because the Kh14N13 **alloys** are liable to the .alpha.-transformation during **plastic deformation**, a new standard **steel** Kh14N20 (Cr 14.5-15.5, Ni 19.5-20.5, and C 0.05-0.06%) was **prepd**. The **steels** were **alloyed** as follows: Kh14N13 with Mo 0.27-3.50, W 0.48-3.30, V 0.24-1.50, Nb 0.16-1.20, Ti 0.17-1.10, Si 0.67-2.92, and Al 0.45-2.56% and Kh14N20 with Mo 0.55-3.15, W 1.23-3.15, V 0.21-2.25, Ti 0.14-2.20, Nb 0.25-2.98, Si 1.18-3.3, and Al 1.1-3.3%. The microstructure and hardness of **alloys** were examd. after **quenching** from 1000 to 1150.degree.. Small amts. of Nb and Ti inhibit the growth of **austenite** grains in Kh14N13 probably due to the presence of finely dispersed slow-coalescing carbides of Ti and Nb. The same effect is exhibited by V and Mo at concns. <2%, while W, Si, and Al do not influence the grain size. With the Kh14N20 **alloys**, the grain growth is practically unaffected by the **alloying**. The **alloy** specimens sustained **cold plastic deformation** by **rolling** with 10-80% **deformation**. The examd. additives, in the rangoe f investigated concns., do not affect the hardening **process** during **cold rolling**. The hardening of Kh14N13-base **alloys** is characterized by an intensive **process** .ltoreq.30% **deformation**, that is followed by a slowing down at 30-50%. This decrease in hardening coincides with the beginning of the .alpha.-transition. However, at still higher degrees of **deformation** when the amt. of the .alpha.-phase is significant, the hardening intensifies again so that the presence of the .alpha.-phase cannot explain this phenomenon. With the Kh14N13 **alloys**, the .alpha.-phase appears as soon as the degree of **deformation** reaches 20-30% and its amt. depends on the **alloying** element. Nb and Ti can increase it .ltoreq.50%. Hot

rolling at 200.degree. prevents the .alpha.-transition so that the softening **process** of Kh14N13 was studied on specimens hot-**deformed** at 200.degree. (80%). The effect of **alloying** elements when softening at 550-900.degree. was assessed according to the temp. variations of hardness and the recrystn. phenomena and it is the same for both groups of **alloys**. Small amts. of additives, with the exception of Nb, have no effect. Nb in concns. as small as 0.16% inhibits the softening of **alloys** and increases the crit. temp. of recrystn. A similar effect is obtained with 0.4% Ti. Al .ltoreq.1.0% does not affect recrystn. and softening. When the Al concn. is raised to 3%, softening is inhibited due to the presence of hardening intermetallide Ni3Al. Elements, such as Nb, Ti, and V (>0.6%) decrease the creep rate at 650.degree., the effect of Nb being very pronounced already at 0.16-0.20%. Al concns. .ltoreq.1% are of no effect; at 3%, the creep rate is decreased.

CC 55 (Ferrous Metals and Alloys)

ST CREEP **AUSTENITIC STEELS; AUSTENITIC STEELS**; CHROMIUM NI **AUSTENITIC STEELS;** NICKEL CR **AUSTENITIC STEELS**

IT Recrystallization
(of **steel**, chromium-nickel, **alloying** effect on)

IT 12597-69-2, **Steel**, properties
(softening and high-temp. strength of **austenitic** chromium-nickel, **alloying** effect on)

L63 ANSWER 30 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1968:42531 Document No. 68:42531 Metallography of .gamma. .fwdarw. .epsilon. .fwdarw. .alpha. transformation in high **alloy steels**.
Schumann, Hermann (Univ. Rostock, Rostock, Fed. Rep. Ger.). Prakt. Metallogr., 4(6), 275-83 (English/German) 1967. CODEN: PMTLA5.

AB In high **alloy steels** based on Mn or Cr-Ni, 2 different kinds of **martensite** can **form** from the f.c.c. **austenite** .gamma., either during **cooling** or after a **plastic deformation** at **low temp.**: the b.c.c. .alpha.-**martensite** or h.c.p. .epsilon.-**martensite**. Three **processes** were suggested as **forming** mechanism: the joint **formation** from **austenite** according to the scheme .gamma. .fwdarw. (.epsilon. + .alpha.), the transformation of .alpha. into .epsilon., and the transformation of .epsilon. into .alpha.. Although it was claimed that no differentiation is possible between the reactions .gamma. .fwdarw. .alpha. .fwdarw. .epsilon. and .gamma. .fwdarw. .epsilon. .fwdarw. .alpha., numerous proofs exist that the latter reaction is the correct one. A complete **martensitic** transformation scheme can be developed for **Fe**-Mn **alloys**. Metallographic investigation of the reaction sequence .gamma. .fwdarw. .epsilon. .fwdarw. .alpha. by means of the light microscope were until now unsuccessful, because the very finely distributed phases could not be revealed by etching and the indirect **methods** of thermal anal. allowed different interpretations. The 3 phases, **austenite**, .epsilon.-**martensite**, and .alpha.-**martensite**, present in high-**alloy** Mn, Mn-C, and Mn-Cr **steels** after **cooling** or plastic **cold-working**, can be colored and thus identified by the etchant Na2S2O3.5H2O + K2S2O5. All metallographic results prove that a .gamma. .fwdarw. .epsilon. .fwdarw. .alpha. transformation occurs during **cooling** as well as **plastic deformation**. Thereby, a relation exists between the .gamma. .fwdarw. .epsilon. and .epsilon. .fwdarw. .alpha. transformation. The .alpha.-**martensite** **forms** within the .epsilon.-**martensite** platelets which can be substantially filled with .alpha.-**martensite** needles.

The same transformation mechanism is probably also valid for Cr-Ni **steels**.
CC 55 (Ferrous Metals and Alloys)
ST **MARTENSITE STEELS**; MANGANESE **STEELS**;
AUSTENITE STEELS
IT 12173-93-2P
RL: FORM (Formation, nonpreparative); PREP (Preparation)
(**formation** of, in chromium-nickel and manganese **steel**
, mechanism of, metallography of)
IT 10102-17-7 16731-55-8
RL: USES (Uses)
(in etching soln. for metallography of **martensite** in
chromium-nickel and manganese **steel**)
IT 12597-69-2, **Steel**, properties
(**martensite formation** in chromium-nickel and
manganese, mechanism of, metallography of)

L63 ANSWER 31 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1967:466891 Document No. 67:66891 Mechanical working of the **austenitic** high-manganese **steel** G 13L. Mikhailov, Toncho; Popov, Ivan Mashinostroene, 16(4), 166-8 (Bulgarian) 1967. CODEN: MASFAZ.
AB This **steel**, contg. C 0.9-1.4 and Mn 14%, has Brinell hardness 185-230 before and 550-650 after **cold working**. For the removal of (**Fe**,Mn)3C and its homogenization in a .gamma.-**Fe** soln. for the C range requires temps. of 850-1130.degree.; however, there appear to be 2 carbide **forms**. This difficult **alloy** is best treated by heating for 13 hrs. from the cold at 50.degree./hr. to 650.degree., holding at 650.degree. for 31/2 hrs., and then heating at 170-180.degree./hr. over 21/2 hrs. to 1080-1100.degree.; after holding at 1080-1100.degree. for 5 hrs., the **steel** is **quenched** in a rapidly circulated cold fluid, such as water. Tests were designed to test the exceptional wear resistance and elasticity and to establish suitable mech. working properties without prohibitive work hardening. The effects of the depth of heating on the modification of the **metal** were established in a special lathe with abrasive and cutting tools; these were correlated with respect to time, abs. temp., and distance vs. speed, **plastic deformation**, and crit. cutting angles.
CC 55 (Ferrous Metals and Alloys)
ST WORKING MN **STEEL**; **AUSTENITIC** MN **STEEL**; MECH PROPS MN **STEEL**; MANGANESE **STEEL**
IT 12597-69-2, **Steel**, uses and miscellaneous
(**cold working** and heat treating of
austenitic manganese)

L63 ANSWER 32 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1966:33825 Document No. 64:33825 Original Reference No. 64:6207c-f The stability of solid solutions in chromium-manganese-nickel **austenitic** stainless **steels** with added nitrogen. Babakov, A. A.; Kozlova, N. A.; Fedorova, V. I. Sb. Tr. Tsentr. Nauchn.-Issled. Inst. Chern. Met., No. 39, 81-6 (Russian) 1965.
AB This work is a continuation of the previous study of B. (CA 56, 2221h). The study was carried out on the effect of Cr, C, and Mn on the structure and mech. properties of **steels** 0Kh20G8AN5 and 0Kh20G6AN5 (contg. N 6.5-8.5%) after **quenching** from various temps.; also the degree of stability of the solid solns. depending on the degree of **plastic deformation**, the stability of **austenite**, and mech. properties at **low temps**. were studied. **Steels** were smelted in a 50-kg. capacity induction furnace,

whereby 2 **ingots** were cast from each heat, one **ingot** contg. 0.03 and the other 0.07% C. **Ingots** were forged at 850-1160.degree. into rods diam. 12 mm. and strips 50 .times. 150 .times. 300 mm.; then these strips were rolled into sheets 3 mm. thick. After **quenching** in water from 1050.degree. these sheets were **cold rolled** with redn. degrees 10, 20, 40, and 60%. Rods were tested for mech. properties at 20, -70, and -196.degree.. Pure **austenitic** structure could be obtained only when Cr concn. was .ltoreq.20-20.5 wt. %, and the temp. of **quenching** was about 1050.degree.. Increase of Cr concn. to 22% **created** at the above indicated conditions 10-20% of **ferrite** phase. Increase in **quenching** temp. led to the **formation** of .alpha.-phase; e.g., **quenching** from 1250.degree. of **steel** contg. 20% Cr led to the **formation** of 5-10% of .alpha.-phase. The **austenite** in all studied **steels** was very stable during **deformation** at room temp.; however, **deformation** at -70 and -196.degree. resulted in **martenisitic** transformation of the **austenite**. Studied **steels** showed high tensile strength (.gtoreq.150 kg./mm.2), while the plasicity was relatively high, too (relative elongation 30-40%). Increased **quenching temp** . resulted in some **decrease** of strength of studied **steels**.

CC 19 (Ferrous Metals and Alloys)

IT Stainless **steel**, Cr-Mn-Ni
(mech. properties and structure of **austenitic**, N effect on)

L63 ANSWER 33 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1965:80611 Document No. 62:80611 Original Reference No. 62:14247b-f Effect of a preliminary **plastic deformation** on the decomposition of an **austenite**. Gulyaev, A. P.; Kashnikova, M. L. Fiz. Metal. i Metalloved., 19(1), 155-8 (Russian) 1965.

AB Cold **plastic deformations** can exert a prolonged influence in some **steels**, even after their recrystn. **Steels** ShKh 15, 60 S 2, and 40KhNMA were **cold rolled**, annealed and their behavior after recrystn. compared with that of nondeformed specimens. Preliminary investigations showed that **austenitization** was completed after 3 min. by annealing at 850.degree.. A high heating rate (9.degree./sec.) permitted the limiting of the annealing time to 3 min. The degrees of **deformation** of ShKh 15 specimens were 20, 50, 75, and 90%. Dilatometric examns. were performed with 10 different **cooling** rates. The results obtained show that a difference exists between **deformed** and nondeformed samples if the degree of **deformation** is >25%, but a further increase of it does not cause any change. Taking this fact into account, for the **steels** 60S2 and 40KhNMA only one degree of **deformation** (50%) was used. A preliminary **plastic deformation** of ShKh 15 contributes to the stability of **austenite** phase and shifts the decompn. curve to the region of **lower temps.**; simultaneously the hardness of the specimens increases. Samples 60S2 and 40KhNMA were annealed at 850.degree. and examd. after **cooling**. The **austenite** -decompn. curves obtained of **deformed** and nondeformed specimens are identical and the hardness of the decompn. **product** is the same as that of nondeformed **metals**. The conditions of **plastic deformation** were altered and 3 new **processes** introduced: (a) 50% **plastic deformation** with a subsequent annealing for 2 hrs. at 600.degree., (b) hot rolling at 400-500.degree. (degree of **deformation** 25%), and (c) rolling of **austenite** compns. at 500.degree.. Neither of these changes the position of decompn. curves. The results found do not

permit any definite conclusion concerning the preservation of structure defects in **steels** after annealing to **austenite** compn., even, for ShKh 15, since the differences observed are not very pronounced (the decompn. curves are shifted for 20.degree.). If some lattice defects remain after annealing, their influence on the rate of the decompn. must be negligible.

CC 19 (Ferrous Metals and Alloys)

IT Crystallization
(re-, of **steel**, **austenite** decompn. and)

IT 12597-69-2, **Steel**
(**austenite** transformation in, **plastic deformation** effect on)

IT 12244-31-4, **Austenite**
(decompn. or transformation of, in **steel**, **plastic deformation** effect on)

L63 ANSWER 34 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1961:111296 Document No. 55:111296 Original Reference No. 55:20862a-g
Strengthening low-**alloy steels** by **deforming austenite**. Grange, R. A.; Mitchell, J. B. (U.S. Steel Corp., Monroeville, PA). Metals Eng. Quart., 1(No. 1), 41-53 (Unavailable) 1961.

AB The change in microstructure by **plastically deforming austenite** and preventing recrystn. of the "hot **cold-worked" austenite** prior to transformation was studied for AISI 4340, 9860, 12% Cr, and 5% Ni-2% Mn **steels**. All specimens were rolled with 5-in.-diam. flat-work rolls and were **deformed** 50-88% in 1-14 passes. The microstructure of the 12% Cr **steel** was similar whether rolled from 1000 to 1800.degree.F., and the hot **cold-working** increased the yield strength over conventional heat-treatment by 15% in the 1400-1800.degree.F. range. **Martensite** morphology of the 5% Ni-2% Mn **steel** showed the **martensite** plates to be preferentially aligned with the long axis parallel to the rolling direction, while an undeformed specimen had random orientation. There was no correlation found between the amt. of transformation by rolling and the time required in the same **steel** for the undeformed **austenite** to begin to transform isothermally. **Deformation** accelerated transformation at rolling temps. <1200.degree.F. Time-temp.-transformation curves for the 5% Ni-2% Mn **steel** showed that the **bainite** temp. region (<900.degree.F.) must be avoided in **cold** hot-**working** to obtain a fully **martensitic** structure on **quenching** to room temp. Rolling stable **austenite** at 1500.degree.F. caused little loss in hardenability in **steels** in which the **bainite** "nose" limits **quenching** to all **martensite**. The microstructure of specimens transformed at 800.degree.F. showed the **bainite** plates tend to align themselves preferentially as did the **martensite** plates. Pearlite colonies **formed** at 1200.degree.F. were smaller and somewhat acicular in appearance compared to pearlite **formed** from undeformed **austenite**. To check the effect of **austenite** grain size on **martensite** plate size, specimens of AISI 4340 **steel** were treated 14 different ways. Tensile and yield strengths were found to vary appreciably. When yield strength was plotted against **austenite** grain size, the hot **cold-worked** specimens with elongated grains were, at any corresponding grain size, stronger than conventionally **processed** specimens with equiaxed grains, **making** the **steel** behave as though it were finer grained. Specimens were tempered at 950.degree.F. for 16 hrs., polished, and etched to delineate the **austenite** grain boundaries for a grain count. The yield strength plotted against the no. of grains

increased proportionally and then leveled off at a count of 80 grains/in. at 100 times. Tensile strength showed a similar trend. Comparison of 400.degree.F. tempered **martensite** microstructures **produced** from the same **austenite** grain size showed that the hot **cold-worked** specimens had more **martensite** plates per unit distance than the undeformed specimens, indicating that more **martensite** grain boundary barriers were present to impede dislocation movement and result in a strengthening effect related to both the prior **austenite** grain size and shape.

CC 9 (Metallurgy)

L63 ANSWER 35 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1960:74075 Document No. 54:74075 Original Reference No. 54:14074g-i,14075a
Some metallurgical factors affecting stress corrosion cracking of **austenitic** stainless **steels**. Uhlig, H. H.; White, R. A. (Massachusetts Inst. of Technol., Cambridge). Trans. Am. Soc. Metals, 52, 830-47 (Unavailable) 1960.

AB 1959 Preprint No. 167. Several grades of Types 304, 321, 347, and 310 stainless **steels** and a 20Cr-20Ni-60Te **alloy** were tested in boiling 42% MgCl2. **Alloys** low in C or N do not fail in 200-600 hrs., but the com. 304 **alloys** fail in 0.2-1.4 hr., chiefly because of N. In the 20Cr-20Ni **alloy**, C confers resistance to cracking. Nb stabilizes the .gamma. phase on **quenching** from 1920.degree.F. Ti does not stabilize the .gamma. phase. Si increases resistance to cracking appreciably. Co and probably B are beneficial. An .alpha. phase 18-8 **steel** is relatively resistant to cracking whether **produced** by transformation on **quenching** from 1920.degree.F. or by **cold work** at room or below room temps. **Austenitic** 18-8 cracks readily, whether the .gamma. phase is stabilized by N, C, or Nb. The mechanism of cracking, involves **formation** of crack-sensitive paths by **plastic deformation**. N diffuses to lattice imperfection sites, such as dislocations, **forming** cathodic areas. The beneficial effect of Si and Ni results from alteration of the pattern of cathodic atms. or ppts., or of inhibiting their **formation** in the same way as they inhibit nucleation of cementite in C **steels**.

CC 9 (Metallurgy)

L63 ANSWER 36 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1959:44416 Document No. 53:44416 Original Reference No. 53:7917i,7918a-d
Low-temperature transformations in **austenitic** **steels** used for instrument **making**. Bogachev, F. A. Trudy Leningrad. Inst. Aviatsion. Priborostroeniya (No. 22), 3-22 From: Abstr. J. Met. (U.S.S.R.) 1957, Nos. 10,11,12, Abstr. No. 131(English translation) (Unavailable) 1957.

AB By the **method** of thermomagnetic and metallographic analysis, the effect was studied of hot and cold **plastic deformation**, partial surface decarburization, and isothermal holding at room temp. on **martensitic** transformation (m.t.) in thermomagnetic **alloys** (C 0.05-0.15, Ni 30.8-37.0, Mn 0.2-2.4, Cr 10-12%), **alloys** with special thermal properties (C 0.05-0.30, Ni 20.0-34, Cr 2.3-2.8, Co 5.7%), and thermo-bimetals (C to 0.36, Ni 22.0-37.0, Cr 2.0-3.0%). Hot-forging of high-Ni **steels** with low C contents, with and without Mn and Co addns., to a large extent suppresses m.t. in comparison with the annealed condition; this is shown in the lowering of the **martensite** point and the reduction of the over-all m.t. effect on subsequent **cooling** to -195.degree. and heating to room temp. In high-Ni **steels** with high C contents and Cr addns., hot-work **makes** the **austenite** practically completely stable against m.t. on **cooling**. Annealing the **steel** in vacuo

at 1050.degree. partially removes the stabilizing effect of hot work. **Cold working** on high-Ni **steels** also increases the stability of the **austenite** against m.t. in deep **cooling**, particularly for **steels** with increased C, but this effect is not the same for different **steels**. Holding at room temp. after **quenching** increases the **austenite** stability in **steels** with low C contents and has no effect on m.t. during subsequent **cooling** and heating of **steels** with high C contents. Holding at **lower temps**. increases the **austenite** stability to an increasing extent, the **lower** the **temp**. and the longer the time. Holding in the **martensitic** range is accompanied by isothermal **martensite formation**. In the **steel** with 0.07% C, 33.0% Ni, and 2.4% Mn and also in **steel** EI 473 (C 0.15, Ni 33.5-37.0, Cr 10.0-12.0%), m.t. is not observed on **cooling** to -195.degree., irrespective of the treatment. Surface decarburization shifts the start of m.t. to the room-temp. region.

CC 9 (Metallurgy)

L63 ANSWER 37 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1957:80919 Document No. 51:80919 Original Reference No. 51:14524g-i,14525a-c
Austenitic chromium-**iron**-nickel **alloys** resistant to stress-corrosion cracking in magnesium chloride. Uhlig, H.; White, A.; Lincoln, J., Jr. (Massachusetts Inst. of Technol., Cambridge). Acta Met., 5, 473-5 (Unavailable) 1957.

AB A progress report. Lab. heats of **austenitic** or ferritic **alloys** are being **made** that do not crack within 1 week or more exposure to boiling 42% MgCl2 test soln., compared to a cracking time of about 1.5 hrs. for com.-type 304 stainless. Specimens were a 1 3/4 in. long .times. 3/16 in. wide .times. 0.040 in. thick, stressed beyond the elastic limit to **form** a U, insulated, spring loaded, fully immersed, with elec. recording of times to failure by cracking. Rate of **deformation** bending the U and stressing at temps. from 25 to 325.degree. had no effect on cracking times. Specimens of 18-8 stressed at -196.degree., after annealing at 1050.degree. and H2O **quenching**, did not crack at all within 170 hrs., compared with a cracking time of 6 hrs. for similar pieces bent at room temp. Sheared pieces not annealed after shearing, but which were stressed similarly at liquid-N temp., failed by cracking within 3 hrs., the observed cracks initiating at sheared edges. **Plastic deformation** at -196.degree. **produced** much more **cold-worked ferrite** than **deformation** at higher temps. Such **cold-worked ferrite** was more resistant to cracking than untransformed **austenite**. Specimens from relatively pure 18-8 **steels** contg. less than 0.01% C and 0.01% N did not crack within a max. test period of 260 hrs. These pure **alloys** underwent a spontaneous transformation to practically all **ferrite** when H2O **quenched** from 1050.degree.. When 0.15% C was added to such an **alloy**, it was **austenitic** as-**quenched**, and av. cracking time of 12 specimens was 2.5 .+-. 0.7 hrs. Similarly, when 0.15% N was added, the **alloy** was **austenitic** as-**quenched**, and av. cracking time of 13 specimens was 1.2 .+-. 0.3 hrs. It seems that N was more damaging than C, but both acted, in 18-8 at least, to cause stress-corrosion cracking where relative immunity existed in their absence. The pronounced effect of Ni in providing increased resistance to stress-corrosion cracking was probably due to it's suppression of nucleation of cementite in the **austenite**-pearlite transformation. It was likely that it acted similarly to suppress nucleation of carbides or nitrides during **plastic deformation** of high-Ni **austenitic alloys**. If

nitrides or carbides did not ppt., susceptibility to stress-corrosion cracking was avoided or diminished. **Plastic deformation** seemed to be a necessary condition for establishing crack sensitivity. Any stress sufficient to cause creep was adequate in time to cause stress-corrosion cracking. This explains why a lower crit. stress for 18-8 had never been clearly defined, because some creep always occurred. It also explains why specimens stressed elastically in other work cracked after an induction period, whereas in this investigation cracks in specimens **plastically deformed** are found to initiate as rapidly as the specimen comes into contact with the test soln.

CC 9 (Metallurgy and Metallography)

L63 ANSWER 38 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1956:19643 Document No. 50:19643 Original Reference No. 50:3977c-h Study of third [stage] transformation during tempering of **steel**.
Gulyaev, A. P.; Burova, N. I. Metalloved. Obrabotka Metal. (No. 1), 40-6 (Unavailable) 1955.

AB Third-stage transformation occurs during tempering in the range 300 to 400.degree.. The present work intended to show that the principal **process** in this tempering is recrystn. rather than the transformation of FekC into Fe3C. C **steels** contg. 0.04 to 1.28% C were **quenched** in a 10% NaOH soln. from a temp. 30 to 50.degree. above A3. Differential dilatometric studies up to 600.degree. with an annealed specimen as the standard were **made** on these **steels**: (a) as **quenched**, (b) after tempering at 280.degree., and (c) after being **cooled** to the temp. of liquid N2 and then tempered at 280.degree.. The 0.04 C **steel** showed 3rd stage transformation (3rd s.t.) only in state (c). The remaining **steels** showed 3rd s.t. in all 3 states. The most intense transformation occurred in the range 280 to 450.degree.. The amt. of C did not det. the temp. of 3rd s.t., but a preliminary tempering below the temp. of 3rd s.t. raised the transformation temp. while a treatment in liquid N2 lowered it. The amt. of 3rd s.t. increased to a max. with increase in C up to 0.6% and then remained about const. Increasing the rate of **cooling** in the **martensite** interval or **cooling** to the temp. of liquid N2 increased the vol. effect during 3rd s.t. This result was explained as an increase in stresses of the second kind. Stresses of the first kind did not affect 3rd s.t. since **quenched** specimens of various diams. showed the same dilatometric effects. The mechanisms of decrease in stresses of the second kind were the breaking of coherency between the carbide phase and the matrix and the **process** of recovery. A dilatometric effect in the range of temp. 400 to 600.degree. was attributed to further relief of stresses accompanying coagulation of carbides, since it did not occur in C-free **alloys** or in **plastically deformed** specimens. Change in sp. vol. was detd. by hydrostatic weighing on **steel** U12 [1.2% C] after **quenching** and then tempering in the range 170 to 600.degree.. The results were similar to those obtained dilatometrically. Pure **Fe** and 2 **steels** were **cold-worked** 10 to 75% by wire drawing and the change in sp. vol. accompanying annealing at temps. from 100 to 600.degree. was detd. The temp. of the transformation and the extent of vol. change, about 0.0006 cc. per g., were similar to those found in 3rd s.t. Stresses of the second kind were detd. from measurements of line widths on x-ray patterns obtained from **steels** contg. 0.36, 0.60, and 1.07% C that had been **quenched** and then tempered in the range 300 to 650.degree.. The stresses fell continuously, but they fell most rapidly in the range 350 to 450.degree..

CC 9 (Metallurgy and Metallography)

L63 ANSWER 39 OF 41 HCAPLUS COPYRIGHT 2002 ACS
1949:8103 Document No. 43:8103 Original Reference No. 43:1700a-i,1701a
Influence of **low temperatures** on the mechanical properties of 18-8 chromium-nickel **steel**. McAdam, D. J., Jr.; Geil, G. W.; Cromwell, Frances Jane J. Research Natl. Bur. Standards, 40(Research Paper No. 1882), 375-92 (Unavailable) 1948.

AB The materials investigated were of the **austenitic** type, except one which was ferritic and amenable to pptn.-hardening. At room temp. transformation from **austenite** to **ferrite** during **plastic deformation** was not sufficient to cause a qual. change in the **form** of the conventional stress-strain curve. At **lower temps**., e.g. -78.degree. and -188.degree., the combined influences of work-hardening and the hardening caused by phase change became apparent. There was no abrupt yield point. At -188.degree. the curve first reached a max., then fell off due to local contraction. This was stopped by a rapid phase change which caused a rise of the curve up to a second much higher max. The local contraction at the second ultimate stress does not necessarily occur at the same spot as the first one. The increase between the first and second max. was greater for annealed than for severely **cold-drawn** material. The greater the **plastic deformation** at room temp., the less is the combined influence of ordinary work-hardening and the hardening due to phase change during **plastic deformation** at **low temps**. Flow-stress curves were obtained by plotting load over actual area vs. ratio of original to actual sectional area (or effective length ratio). The flow-stress lines obtained at room temp. with the **cold-drawn** plain **alloys** rise with increasing slope, thus showing the effect of the pptn.-hardening during **plastic deformation**. At **low temps**., as in the conventional stress-strain curves, there were clear indications of the phase change; in addn. their reversal of curvature and steep rise after the beginning of local contraction must be attributed to the hardening caused by rapid pptn. of **ferrite** throughout the **austenite**. In the true stress-strain curves there was no drop between maxima as it did not represent a yield but merely the effect of local contraction. All **low-temp**. flow-stress curves of previously **cold-worked alloys** did show an abrupt drop in the stress beyond the first max. An explanation may be found in the assumption that the specimens remained cylindrical during the extension; the true strain may be considerably greater than indicated by the av. extension of the specimen. Inertia effects probably accentuate the abrupt drop. The true flow stress probably rises continuously with the **plastic deformation** of either annealed or **cold-drawn** 18-8 **alloys** . As followed on a Mo-contg. **alloy**, the ductility of the metastable **austenitic alloys** was not markedly affected by the hardening caused by the phase change. In the case of a ferritic **alloy** contg. Ti and Al, the ductility **decreased** rapidly at **low temps**. The results of magnetic tests verified the view that the rapid rise of flow stresses with **plastic deformation** at **low temps**. is due to a rapid transformation of **austenite** to **ferrite**. The strength of 18-8 stainless at **low temps**. requires 6 indexes for definition: yield stress, first ultimate stress, stress at a min. of the load-extension curve, stress at a reversal of the curve, second ultimate stress, and true fracture stress. The increase in yield stress with **decrease** in **temp**. was less rapid than the increase of any other index except the first ultimate stress. The greater the amt. of prior **plastic deformation** the less do the indexes diverge with **decrease** in **temp**. The yield stress of

the ferritic **alloy** rises much more rapidly with **decrease** in **temp**. than that of the metastable **austenitic alloys**. The course of all curves indicates that with **decrease** in **temp**. below that of liquid air the influence of temp. on the strength indexes decreases gradually. In notched specimens, the plastic strain necessary for the load to reach a max. at **low temps**. was more than that for an unnotched specimen at the first max. The ductility decreased with decrease in the notch-angle and with **decrease** in **temp**. The combined effects on ductility were less severe for 18-8 **alloys** than for pearlitic **steels**. The phase change during **plastic deformation** contributes to the toughness of both notched and unnotched specimens.

CC 9 (Metallurgy and Metallography)

L63 ANSWER 40 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1930:2702 Document No. 24:2702 Original Reference No. 24:325h-i The brittle range in 18 and 8 chromium-nickel **iron**. Lester, H. H. Trans. Am. Soc. Steel Treating, 16, 743-61 (Unavailable) 1929.

AB Brittleness in Cr-Ni **irons**, contg. less than 0.1% C, is due to **formation** of **ferrite** crystals and to pptn. of Fe4C or Cr4C along at. planes in **austenite** grains that normally would be favorable to slip. Pptn. is a consequence of **plastic deformation** of the **metal**. At temp. of max. brittleness and with a relatively small quantity of mech. work the **ferrite** crystals and carbide particles tend to remain diffused within the **austenite** grains, which are rendered brittle thereby. Greater **cold work** causes the carbides to collect along grain boundaries as uncoagulated aggregations of submicroscopic particles. At elevated temps. the carbides tend to coagulate. A well-defined Ac1 point was found at 1330.degree.F. on heating and at 1148.degree.F. on **cooling**, which may be assocd. with loss of duetility.

CC 9 (Metallurgy and Metallography)

L63 ANSWER 41 OF 41 HCAPLUS COPYRIGHT 2002 ACS

1915:19356 Document No. 9:19356 Original Reference No. 9:3206b-i,3207a Report of the tests of **metals** and other materials, **made** at Watertown arsenal during 1914. Anon. (U. S. War Dept.). Document, 477, 217 pp.,illus. (Unavailable).

AB To det. the effect of streaks in shrapnel cases **made** from bar stock, the cases were subjected to hydraulic pressure until fracture occurred. The tests showed that streaks are an indication of weakness and that cases **made** from forgings are stronger than those **made** from bar stock. Tests were carried out to det. the resistance of several types of rotating bands on projectiles and it was found that the resistance of the band increases with the width and with the amt. of **cold working**; Cu deposited on the lands and grooves of the gun increases the resistance materially but lubrication has no apparent effect. The examn. of a breach bushing from a 14-in. gun which cracked in service indicated that the **metal** was defective owing to improper heat treatment, the presence of slag and local segregation. Charpy impact tests were **made** on **steel** axels and crank pins from locomotives and it was found that specimens taken normal to the direction of forging give lower values than those taken along the direction of forging and that longitudinal sections are much more uniform than those taken normal to the direction of forging. Expts. on the heat treatment of Ni-V **steel** with 3.45% Ni and 0.27% V, showed that the cast **metal** is harder and the forged **metal** more ductile. The effect of varying amts. of Ni and Cr on the critical temp. of **steel** with 0.50% C and 0.50% Mn was

studied and it was found that increasing Ni content **lowered** the critical **temps**. with Ar1 **decreasing** more rapidly than Ac1 but with Cr the critical temp. rizes with increasing Cr content, Ar1 rizing faster than Ac1. Bronzes were examd. with regard to the size of grain and strength. The microscopic structure of these bronzes was interesting because of the great difference in the fractures of the various specimens and the correlation of the structure with the mechanical properties of the **alloy**. The microscopic examn. of test specimens of gun forgings was undertaken to obtain information regarding the heat treatment of gun **steels** and to get data as to the possibility of incorporating into the existing specifications a clause relating to the type of microstructure. The usual structure was found to be sorbitic, indicating proper heat treatment but in some cases the specimens showed a less desirable structure with well-developed cell walls of **ferrite**. In studying the erosion of guns, further evidence was obtained on the cause of the hard surface layer in guns. Such a layer could result from the **steel** being heated above the critical temp. followed by rapid **cooling**, by cementation caused by the **products** of combustion of powder at the prevailing high temp. and pressure, or by mechanical work due to the friction of the rotating band in the gun. A study of the **metal** showed that erosion was not due to cementation, as no cementite was found by the Na picrate test. The cause of erosion is evidently a combination of heat effect and mechanical work. The rotating band of the projectile **produces** enough friction to cause a flow of **metal** and the **formation** of a hard, amorphous layer on the rifling of the gun. The action on the pressure plugs was selective and the max. hardening effect was observed where the **metal** had been strained previously as by stamping letters with a die. Thus, in stamping the letter O, some **metal** was **compressed** toward the center of the letter and the hard layer appeared uniformly on the inner edges of the letter with hardly a trace on the outer edges. Troostite was found adjacent to the hard layer in some cases, but **martensite** has not been found; its normal structure is probably destroyed by **plastic deformation** , although the hard layer by tempering breaks down into troostite.

CC 9 (Metallurgy and Metallography)

=> file japio

FILE 'JAPIO' ENTERED AT 15:17:25 ON 15 NOV 2002

FILE LAST UPDATED: 29 OCT 2002 <20021029/UP>
FILE COVERS APR 1973 TO JUNE 28, 2002

>>> JAPIO has been reloaded on August 25 and saved answer sets will no longer be valid. SEE HELP RLO for details <<<

=> d L68 1-4 ibib abs ind

L68 ANSWER 1 OF 4 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 2000-119745 JAPIO
TITLE: **METHOD** FOR WORKING **MARTENSITIC** HEAT RESISTANT **STEEL**
INVENTOR: NISHIUCHI SHOHACHI
PATENT ASSIGNEE(S): HONDA MOTOR CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000119745	A	20000425	Heisei	**C21D008-00**

APPLICATION INFORMATION
STN FORMAT: JP 1998-294816 19981016
ORIGINAL: JP10294816 Heisei
PRIORITY APPLN. INFO.: JP 1998-294816 19981016
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000

AN 2000-119745 JAPIO

AB PROBLEM TO BE SOLVED: To unnecessitate heating equipment and to attain the reduction of the cost and environmental improvement by annealing **martensitic** heat resistant **steel** to reduce its hardness and thereafter executing **cold working** in a specified temp. range.
SOLUTION: Annealing before **cold working** is executed preferably at 750 to 1,100°C two times. Then, the **cold working** is executed at a room temp. to 150°C. As the compositional ratio of **martensitic** heat resistant **steel** , the one in which the content of C is 0.35 to 0.55 wt.% and the content of Cr is 5 to 12 wt.% is suitable. Moreover, since in the **cold working**, in a material, heat **generation** occurs in accompany with the **deformation**, and its temp. increases, by removing this heat **generation** with a **chiller** or the like, its upsetting ratio can be increased. Also, in the case that the **cold working** is executed by a plurality of stages using different **metal** molds instead of using a **chiller**, since **cooling** is executed at the time of replacing the mold, the critical upsetting ratio becomes higher than that in the case of working by one stage.
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IC ICM **C21D008-00**
ICS F01L003-02
ICA **C22C038-00; C22C038-18**

L68 ANSWER 2 OF 4 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1997-287056 JAPIO
TITLE: **WIRE** ROD AND BAR **STEEL** EXCELLENT ON COLD FORGEABILITY AND THEIR **PRODUCTION**
INVENTOR: FUKUOKA KAZUAKI; MAEDA TATSUO; EGUCHI TOYOAKI
PATENT ASSIGNEE(S): TOA STEEL CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 09287056	A	19971104	Heisei	**C22C038-00**

APPLICATION INFORMATION
STN FORMAT: JP 1996-101085 19960423
ORIGINAL: JP08101085 Heisei
PRIORITY APPLN. INFO.: JP 1996-101085 19960423
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1997

AN 1997-287056 JAPIO

AB PROBLEM TO BE SOLVED: To decide conditions in which cracking is not **generated** on the boundary between **ferrite** and partite even if the **cold working** rate is increased as-hot rolled, and furthermore, **deformation** resistance is small.

SOLUTION: A slab having a compsn, contg., by weight, 0.05 to 0.40% C, 0.3 to 3.0% Si and 0.3% to 3.0% Mn, furthermore contg. at least one kind among <=2.0% Cr, <=0.5% Mo, <=1.0% Ni, <=0.3% To, <=0.3% Nb and <=0.3 V, and the balance **Fe** with inevitable impurities is subjected to hot rolling to **form** into a bar **steel** or a wore rod, and then, this bar **steel** or **wire** rod is **cooled** at a **cooling** rate of >=10°C/sec, by which the **metallic** structure of the bar **steel** or **wire** rod is **formed** into the one composed of, by volume, 3 to 20% residual **austenite** and 3 to 70% **ferrite**, and the balance baiting and/or **martensite**. Since softening can be obviated at the time of **producing** automobile parts, machine parts or the like and the service lives of tools at the time of **cold** intensive **working** can be prolonged, it contributes to the conservation of energy and the reduction of cost.

IC ICM **C22C038-00**
ICS **C21D008-06; C22C038-04; C22C038-50**

L68 ANSWER 3 OF 4 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1988-255340 JAPIO
TITLE: FLAT TENSION SHADOW MASK MATERIAL AND **PRODUCTION** THEREOF
INVENTOR: SEO TAKEHISA; WATANABE RIKIZO
PATENT ASSIGNEE(S): HITACHI METALS LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 63255340	A	19881021	Showa	**C22C038-16**

APPLICATION INFORMATION
STN FORMAT: JP 1987-90360 19870413
ORIGINAL: JP62090360 Showa
PRIORITY APPLN. INFO.: JP 1987-90360 19870413
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1988

AN 1988-255340 JAPIO

AB PURPOSE: To **produce** a flat tension shadow mask material having high yield strength and high elastic elongation by heating an **Fe**-Cu **alloy** having a specified compsn. to **austenitize** the structure, **cold working** the **alloy** and carrying out specified heat treatment.
CONSTITUTION: An **alloy** consisting of 1.0∼4.0wt.% Cu and the balance **Fe** with impurities is heated to >=830°C to **austenitize** the structure and a C supersatd. solid soln. is **formed** in the α-**iron** by **quenching**. The **quenched alloy** is **cold worked** at >=10% rate to cause **work** hardening and the **cold worked** material is heated to 300∼700°C. By this heating, the strain is relieved and a primary solid soln. of Cu is precipitated to precipitation-strengthen the material. Thus, a flat tension shadow mask material having >=50kgf/mm<SP>2</SP> offset yield stress strength at 0.2% permanent set at room temp. and >=0.1% elastic elongation and hardly causing plastic **deformation** is obtd.

IC ICM **C22C038-16**
ICS **C21D009-46; C22C038-00**

L68 ANSWER 4 OF 4 JAPIO COPYRIGHT 2002 JPO

ACCESSION NUMBER: 1987-228431 JAPIO
TITLE: **MANUFACTURE** OF **WIRE** ROD FOR LONG-SIZED HIGH TENSION **STEEL WIRE**
INVENTOR: TAKAHASHI TOSHIHIKO; ASANO YOSHIYUKI; KONO ROKURO; NINOMIYA TAKASHI; CHIBA HIDEO; SASAKI YOSHIYUKI; MURAO MASATSUGU; MURAO KAZUHIKO
PATENT ASSIGNEE(S): NIPPON STEEL CORP
NANIWA SEITEI KK
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 62228431	A	19871007	Showa	**C21D009-52**

APPLICATION INFORMATION
STN FORMAT: JP 1985-244048 19851101
ORIGINAL: JP60244048 Showa
PRIORITY APPLN. INFO.: JP 1985-244048 19851101
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1987
AN 1987-228431 JAPIO
AB PURPOSE: To easily **manufacture** a **wire** rod suitable for a **deformed wire** for a submarine **cable** by welding **wire** rods **formed** by the hot rolling of **steel ingots** having a specified and by heat treating the weld zone of the resulting long-sized **wire** rod under specified conditions to **form** a fine **ferrite**-pearlite structure.
CONSTITUTION: **Steel ingots** having a composition consisting of, by weight, 0.30∼0.65% C, >=1.0% Si, 0.3∼1.5% Mn, <=1.2% Cr (Mn+Cr=0.3∼1.5%), 0.0005∼0.3% in total of or more among 0.002∼0.1% Al, 0.002∼0.1% Ti, 0.0005∼0.3% Nb, 0.001∼0.3% V and 0.0005∼0.1% B and the balance **Fe** with inevitable impurities and having >=0.75% Ceq [Ceq=C+1/5(Mn+Cr)'] are hot rolled to **form wire** rods. The **wire** rods are welded and the weld zone of the resulting long-sized **wire** rod is heated, held at a temp. in the **austenite** range and **cooled** at 3∼20°C/sec **cooling** rate to **form** a **ferrite**-pearlite structure. Thus, a **wire** rod for a long-sized high tension **steel wire** having superior weldability and **cold workability** is obtd.
COPYRIGHT: (C)1987,JPO&Japio
IC ICM **C21D009-52**
ICA **C22C038-00; C22C038-32**

=> d L69 1-29 ibib abs ind

L69 ANSWER 1 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 2002-173712 JAPIO
TITLE: **METHOD** FOR HEAT-TREATING **METALLIC** RING
INVENTOR: IMAI HITOSHI; NAKAJIMA KATSUYUKI; TAKAHASHI TOMOJI
PATENT ASSIGNEE(S): HONDA MOTOR CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2002173712	A	20020621	Heisei	C21D009-40

APPLICATION INFORMATION

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     STN FORMAT:           JP 2000-370597        20001205
     ORIGINAL:             JP2000370597          Heisei
PRIORITY APPLN. INFO.:     JP 2000-370597       20001205
SOURCE:                    PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                           Applications, Vol. 2002
AN    2002-173712     JAPIO
```

AB PROBLEM TO BE SOLVED: To provide a **method** for heat-treating a **metallic** ring with which **deformation** of the **metallic** ring can be reduced in a **cooling**-treatment after applying a solution treatment.

SOLUTION: The solution treatment is applied to a rolled **metallic** ring 4 after rolling the **metallic** ring 4 **formed** by cutting an annular drum 2 **formed** by welding both end parts of a thin plate 1 of maraging **steel** into a prescribed width. After applying the solution-treatment, the **cooling** from the starting temperature of **martensitic** transformation to the completing temperature of **martensitic** transformation in the **metallic** ring 4, is performed at 3-50°C/min **cooling** speed. The above **cooling** is desirably performed at 5-50°C/min, further desirably performed at 10-50°C/min **cooling** speed.


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IC    ICM  C21D009-40
      ICS  C21D009-50; F16G005-16
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L69  ANSWER 2 OF 29  JAPIO  COPYRIGHT 2002 JPO
ACCESSION NUMBER:          2000-230527    JAPIO
TITLE:                     SELECTIVELY QUENCHED CARBON STEEL
                           SCREW
INVENTOR:                  BAUER MARK D; SPRING WILLIAM A; STAROZHITSKY MICHAEL;
                           ULHASAN RIAZ S
PATENT ASSIGNEE(S):        ILLINOIS TOOL WORKS INC <ITW>
PATENT INFORMATION:
```

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000230527	A	20000822	Heisei	F16B025-00

```
APPLICATION INFORMATION
     STN FORMAT:           JP 2000-6321          20000112
     ORIGINAL:             JP2000006321          Heisei
PRIORITY APPLN. INFO.:     US 1999-229435       19990113
SOURCE:                    PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                           Applications, Vol. 2000
AN    2000-230527     JAPIO
```

AB PROBLEM TO BE SOLVED: To prevent **generation** of damages in a slot by selectively **quenching** a head part of a screw into a **martensitic metal** structure in a top surface of a central area thereof and into the **ferriteperlite** metallographic structure at a bottom surface thereof.

SOLUTION: In a head part 12 of a screw 10, when a top surface 24 adjacent to a central area 28 is directly heated by a flame injecting part or other heat source, upheaval parts 40, 42 of a slot 32 are heated strongest, and metallographic structure thereof is changed from the **ferriteperlite** metallographic structure to the **austenite** metallographic structure. A bottom part 26 of the head part 12 and a barrel part 14 are controlled so as to prevent the **generation** of structure change. At the time of flowing or spraying the quick **cooling** fluid to the top surface 24, in order to restrict the influence of the quick **cooling** work to the screw part, the

supplied quick **cooling** fluid is fallen from the head part 12. Peripheral part of the upheaved parts 40, 42 are changed to the **martensitic** metallographic structure. Strength and hardness of the slot 32 are improved, and **generation** of **deformation** and damage at operation of a screw driver with the high torque can be reduced.
COPYRIGHT: (C)2000,JPO
IC ICM F16B025-00
ICS F16B035-00

L69 ANSWER 3 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 2000-192139 JAPIO
TITLE: THERMOMECHANICAL TREATING **METHOD** FOR **STEEL**
INVENTOR: HOSHINO TOSHIYUKI; AMANO KENICHI; TAKAGI SETSUO; TSUCHIYAMA AKIHIRO
PATENT ASSIGNEE(S): KAWASAKI STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000192139	A	20000711	Heisei	C21D008-00

APPLICATION INFORMATION
STN FORMAT: JP 1998-372351 19981228
ORIGINAL: JP10372351 Heisei
PRIORITY APPLN. INFO.: JP 1998-372351 19981228
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
AN 2000-192139 JAPIO
AB PROBLEM TO BE SOLVED: To obtain a **ferritic** structure having fine crystal grains by working of low **deformation** resistance.
SOLUTION: **Steel** contg. <=0.5 mass % Cu is heated to an **austenitic** region and is thereafter held at this temp. for a time satisfying the condition shown by the inequality. After that, it is hot-worked at super **cooled austenite** of <=800°C to dynamically **generate ferritic** transformation. In the inequality, P denotes a heat treating parameter, T denotes heating temp., and (t) denotes holding time (sec). The **steel** moreover contains, by mass, one or >= two kinds among <=0.1% C,=0.8% Si, <=2.0% Mn, 0.01 to 3.0% Cr, 0.01 to 3.0% Mo, 0.25 to 3.0% Ni, 0.005 to 0.1% Ti, 0.005 to 0.1% Nb, 0.005 to 0.1% V, <=0.10% Al, 0.001 to 0.010% Ca, 0.001 to 0.020% rare earth **metals** or the like.
COPYRIGHT: (C)2000,JPO
IC ICM C21D008-00
ICS C22C038-00; C22C038-58

L69 ANSWER 4 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 2000-055285 JAPIO
TITLE: **LOW-TEMPERATURE** FLUID CARRIER EQUIPMENT
INVENTOR: KUBO NAOSHIGE; IWAHASHI HIROSHI; YAMAMOTO SHUJI; OGAWA KAZUHIRO; AKIYAMA MASAO; MASATOMO HIROAKI; KOMORI KANJI; KISHIMOTO SETSUJI; TAKEUCHI NOBUYOSHI
PATENT ASSIGNEE(S): OSAKA GAS CO LTD
SUMITOMO METAL IND LTD
KAWASAKI HEAVY IND LTD
PATENT INFORMATION:

PATENT NO KIND DATE ERA MAIN IPC

JP 2000055285	A	20000222	Heisei	F16L053-00

APPLICATION INFORMATION
STN FORMAT: JP 1998-227066 19980811
ORIGINAL: JP10227066 Heisei
PRIORITY APPLN. INFO.: JP 1998-227066 19980811
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000

AN 2000-055285 JAPIO

AB PROBLEM TO BE SOLVED: To constitute a carrier pipe without having any loop pipe or suppressing the number of loop pipes as less as possible by **forming** the carrier pipe of a low thermal expansion part composed of **Fe**-Ni based low thermal expansion coefficient **alloy**
.
SOLUTION: A pipe 1 carrying extremely **low temperature** liquefied gas is constituted of a low thermal expansion part **formed** of **Fe**-Ni based low thermal expansion coefficient **alloy** called invar **alloy**. The thermal expansion coefficient of the **Fe**-Ni based low thermal expansion coefficient **alloy** is approximately 1/10 compared with **austenite** based stainless **steel** used for a conventional pipe and the **deformation** of the carrier pipe **formed** of using the invar **alloy** caused by the expansion/contraction can be extremely minimized compared with the conventional pipe so that, when the both ends of the pipe 1 are fixed without providing any loop pipe, the thermal stress **generated** in the pipe 1 never exceeds the tolerable stress. This constitution can eliminate an overhang part in a part from one end 2 to the other end 3.

IC ICM F16L053-00
ICS F16L051-00

L69 ANSWER 5 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1999-222627 JAPIO
TITLE: ROLLING MEMBER AND ITS **PRODUCTION**
INVENTOR: TAKAYAMA TAKEMORI; NAKAO TSUTOMU
PATENT ASSIGNEE(S): KOMATSU LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 11222627	A	19990817	Heisei	C21D009-32

APPLICATION INFORMATION
STN FORMAT: JP 1998-33774 19980130
ORIGINAL: JP10033774 Heisei
PRIORITY APPLN. INFO.: JP 1998-33774 19980130
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1999

AN 1999-222627 JAPIO

AB PROBLEM TO BE SOLVED: To reduce the **deformation** resistance in the plastic working when **producing** a shape stock in which a gear having high strength or the like is easily by a plastic working **method** and furthermore to stably execute plastic working at a lower temp. with high precision.
SOLUTION: In an **alloy steel** substantially consisting of an **iron** series, a **steel** contg. at least, by weight, 1.5 to 4.5% Si, furthermore contg. <=0.35% C, and the balance substantially **Fe** with inevitable impurities is used and is

subjected to one or more kinds of heat treatment among carburizing, carbonitriding and nitriding and **quenching** treatment, by which the surface layer has a structure essentially consisting of **martensite** and residual **austenite** and contg. no α **Fe** phases, and the inside has a structure **cooled** from the (α+γ) **Fe** phase two phase region.

IC ICM C21D009-32
ICS C23C008-22; C23C008-26; C23C008-32
ICA C22C038-00; C22C038-06; C22C038-54

L69 ANSWER 6 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1998-196320 JAPIO
TITLE: **MANUFACTURE** OF ABRASIVE RESISTANT MACHINE PART
INVENTOR: SHIM TONG SEUB; KIM KYUNG WOON
PATENT ASSIGNEE(S): DAEWOO HEAVY IND CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 10196320	A	19980728	Heisei	F01L001-14

APPLICATION INFORMATION
STN FORMAT: JP 1998-11900 19980105
ORIGINAL: JP10011900 Heisei
PRIORITY APPLN. INFO.: KR 1996-76867 19961230
PRIORITY APPLN. INFO.: KR 1996-76868 19961230
PRIORITY APPLN. INFO.: KR 1997-33468 19970718
PRIORITY APPLN. INFO.: KR 1997-33469 19970718
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1998

AN 1998-196320 JAPIO

AB PROBLEM TO BE SOLVED: To adjust a crown value of an abrasive resistant member by laminating the abrasive resistant member on a **metallic** main body through a brazing material when an abrasion resistant chip is joined to a tappet or the like, and **deforming** the abrasion resistant member in a crown shape by **cooling** this laminated body after being heated in a specific temperature range.
SOLUTION: When an abrasive resistant machine part 10 is **manufactured**, a silicon nitride chip 14 is layered on a **steel** main body 12 through a brazing material 16, and this layered **product** is **cooled** after heated up to a joining temperature. In this way, when the laminated body is **cooled** after being heated to a temperature higher than a melting point of the brazing material 16, the silicon nitride chip 14 is joined to the **steel** main body 12 by the brazing material 16, and the **steel** main body 12 contracts larger than the silicon nitride chip 14 in a **cooling process**, and the silicon nitride chip 14 is **deformed** in a crown shape. In this case, a crown value of the silicon nitride chip 14 is precisely adjusted by optionally selecting the joining temperature between an **austenite** transformation starting temperature and an **austenite** transformation finish temperature of the **steel** main body 12.

IC ICM F01L001-14
ICS B23K001-19; C04B037-02; C21D009-00

L69 ANSWER 7 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1998-036943 JAPIO

TITLE: **MANUFACTURE** OF **IRON** -MANGANESE-SILICON SHAPE MEMORY **ALLOY**
INVENTOR: KAWARAGI TAKESHI; HIRAI MASAZUMI; WATABE TOSHIO; MARUYAMA TADAKATSU
PATENT ASSIGNEE(S): TAIHEIYO KINZOKU KK
AWAJI SANGYO KK
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 10036943	A	19980210	Heisei	C22C038-00

APPLICATION INFORMATION
STN FORMAT: JP 1996-195073 19960724
ORIGINAL: JP08195073 Heisei
PRIORITY APPLN. INFO.: JP 1996-195073 19960724
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1998
AN 1998-036943 JAPIO
AB PROBLEM TO BE SOLVED: To obtain a shape memory **alloy,** free from the occurrence of cracking at the time of stress **deformation,** in high **manufacturing** yield by specifying hot working conditions and heat treatment conditions for the shape memory **alloy,** respectively.
SOLUTION: At the time of **manufacturing** a shape memory **alloy** having a composition consisting of, by weight, 15-40% Mn, 3.5-8% Si, and the balance **Fe,** the **alloy** is held and annealed at a temp. in the region between >1000 and <1200°C for >=15min after **forming** by hot rolling or hot forging or after **forming** and **cooling.** By this procedure, the precipitation of the secondary phase of intermetallic compound resulted from macroscopic and microscopic component segregation can be prevented, and also the occurrence of cracking at the time of work-induced **martensitic** transformation by stress **deformation** can be prevented. Further, the amount of retained **martensitic** phase at room temp,. can be reduced, and shape memory characteristic can be improved. Moreover, one more more kinds among <=10% Cr, <=10% Ni, <=10% Co, <=2% Mo, <=1% C, <=1% Al, and <=1% Cu can be incorporated into this **alloy**, and/or, other than the above components, <=0.01% S and <=0.02% P can be added and also 0.0005-0.005% of one or more elements among Ca, Mg, and rare earth elements can be added.

IC ICM C22C038-00
ICS C21D006-00; C21D008-00

L69 ANSWER 8 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1996-270441 JAPIO
TITLE: EXHAUST GAS CATALYTIC CONVERTER SYSTEM FOR INTERNAL COMBUSTION ENGINE
INVENTOR: YAMADA KEIJI; SAKASHITA KEIICHI
PATENT ASSIGNEE(S): IBIDEN CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 08270441	A	19961015	Heisei	F01N003-28

APPLICATION INFORMATION
STN FORMAT: JP 1995-97799 19950329
ORIGINAL: JP07097799 Heisei

PRIORITY APPLN. INFO.: JP 1995-97799 19950329
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1996

AN 1996-270441 JAPIO

AB PURPOSE: To prevent the thermal degradation of a catalyst, the **deformation** of a catalyst carrier, and the like by **forming** such structure that a space into which **cooling** air flows us **formed** between the catalyst carrier and a heat insulating material layer bonded to a **metallic** protector by the thermal expansion difference between the catalyst carrier and the **metal** protector when the catalyst carrier temperature reaches the specified value or higher.

CONSTITUTION: An exhaust gas catalytic converter system for an internal combustion engine is provided with a catalyst carrier 1 **formed** of **ferritic** stainless **steel**, a **metal** cone 2, a **metal** protector 3 **formed** of **austenitic** stainless **steel**, a heat insulating material layer 4 bonded to the protector 3, and the like. Immediately after the start of an engine, the catalyst carrier 1 and the heat insulating material layer 4 are adhering closely to each other so as to reach the activation temperature area of a catalyst in a short time by heat insulating effect. When the exhaust gas temperature reaches 200°C or higher, a space is **formed** among the carrier 1, the cone 2 and the heat insulating material layer 4 by the expansion coefficient difference of the carrier 1, cone 2 and protector 3, and the travel air flows into this space to **lower** the **temperature** of the carrier 1. The thermal degradation or the like of the catalyst can thereby be prevented so as to keep exhaust gas control function desirable.

IC ICM F01N003-28

ICS F01N003-28; F01N003-20; F01N003-20; F01N003-24; F01N007-14

L69 ANSWER 9 OF 29 JAPIO COPYRIGHT 2002 JPO

ACCESSION NUMBER: 1996-259341 JAPIO

TITLE: CERAMIC-**METAL** JOINED BODY AND ITS **PRODUCTION**

INVENTOR: MATSUKI RYUICHI; TAKENOUCHI TAKEYOSHI; KAWANOBE AKIO

PATENT ASSIGNEE(S): MITSUBISHI MATERIALS CORP

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 08259341	A	19961008	Heisei	C04B037-02

APPLICATION INFORMATION

STN FORMAT: JP 1995-67790 19950327

ORIGINAL: JP07067790 Heisei

PRIORITY APPLN. INFO.: JP 1995-67790 19950327

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1996

AN 1996-259341 JAPIO

AB PURPOSE: To obtain a joined body controlled in **deforming** amount of ceramic and free from occurrence of crack by relaxing heat stress by each carrying out specific treatment after or before joining in providing a joined body of ceramic with an **iron**-based **metal** body.

CONSTITUTION: This joined body of ceramic (e.g. silicon nitride) with an **iron**- based **metal** body (e.g. carbon **steel** S20C) is obtained by carburizing the surface of the **iron**-based **metal** body before joining and **cooling** the **metal**

body at 1-100°C/sec under conditions preventing transformation of pearlite of the **iron**- based **metal** body after joining, preferably in the neighborhood of starting temperature of pearlite transformation and constituting the **iron**-based **metal** body so as to have one or more structures comprising **martensite** structure **produced** from supercooled **austenite** and/or other supercooled structure and relaxing heat stress **generated** in ceramic and the **iron**-based **metal** body by volume expansion in transformation.

IC ICM C04B037-02
ICS B23K001-19

L69 ANSWER 10 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1995-157822 JAPIO
TITLE: PRESS **QUENCHING METHOD**
INVENTOR: AKIYAMA MASATOSHI; SASA ISAMU; MORIMOTO KYUICHI
PATENT ASSIGNEE(S): HIGH FREQUENCY HEATTREAT CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 07157822	A	19950620	Heisei	C21D001-18

APPLICATION INFORMATION
STN FORMAT: JP 1993-340196 19931208
ORIGINAL: JP05340196 Heisei
PRIORITY APPLN. INFO.: JP 1993-340196 19931208
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1995

AN 1995-157822 JAPIO

AB PURPOSE: To prevent a **steel product** from being **deformed** at caused by **quenching** treatment by **quenching** the long **steel product** by means of specific temp. **cooling** liquid while fixing the **product** with a press die having the specific structure.
CONSTITUTION: At the time of executing the **quenching** treatment of the long **steel** material 15 **made** of a middle carbon low **alloy steel**, etc., the high temp. **steel** material 15 to be treated is laid on the die surface 2 of a receiving die 1 having receiving die surfaces 2, 3 orthogonally crossing the upper surfaces. The long **steel** material 15 is press-fixed to the right angle die surfaces 2, 3 of the receiving die 1 with the pressing die surface 6 of a pressing die 4 for the vertical direction and the pressing the surface 7 of a pressing die 5 in the horizontal direction. In this case, circular arc grooves are **formed** in the prescribed pitch on the die surfaces 2, 3 of the receiving die 1 and the die surfaces 6, 7 of the pressing dies 4, 5. Two times of the **quenching** treatments are executed to the **steel** material 15 to be treated in the fixed condition with this receiving die 1 and both pressing dies 4, 5 with the **cooling** water having the temp. from the starting temp. of **martenstic** transformation (Ms point) to the finishing temp. of **martenstic** transformation (Mf point) and the **cooling** water having the temp. lower than the above temp. to obtain the **steel** material having no **deformation** caused by the **quenching**.

IC ICM C21D001-18

L69 ANSWER 11 OF 29 JAPIO COPYRIGHT 2002 JPO

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ACCESSION NUMBER:        1995-054097    JAPIO
TITLE:                   ASSEMBLING METAL PIECE FOR TEMPORARY
                         STRUCTURE MADE OF CAST IRON
INVENTOR:                KON TSUGIO; SHIBUYA SHINICHIRO
PATENT ASSIGNEE(S):      NIPPON KOSHUHA KOGYO KK
                         KOSHUHA CHUZO KK
PATENT INFORMATION:

     PATENT NO       KIND   DATE         ERA     MAIN IPC
     ------------------------------------------------------
     JP 07054097      A      19950228    Heisei  C22C037-00

APPLICATION INFORMATION
     STN FORMAT:         JP 1993-219117        19930811
     ORIGINAL:           JP05219117            Heisei
PRIORITY APPLN. INFO.:   JP 1993-219117      19930811
SOURCE:                  PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                         Applications, Vol. 1995
AN   1995-054097    JAPIO
AB   PURPOSE: To improve the tensile strength, prevent the plastic
     deformation and increase the clamping force by making an
     assembling metal piece of cast iron of the specific
     composition with austempering.
     CONSTITUTION: An assembling metal piece is made of
     ductile cast iron having a composition consisting of, by weight,
     2.0-3.5% Si, 0.1-0.7% Mn, and/or one or more kinds of 0.05-2.0% Cu,
     0.10-2.0% Ni, and 0.05-0.5% Mo, and the balance substantially Fe
     and small amount of impurities. After this material is kept at
     820-950&deg;C for 0.5-5 hours, the austemper treatment is executed where
     the material is rapidly coolded to 280-360&deg;C, and kept for
     0.5 hour or more to obtain the bainite structure. This
     constitution provides the tensile strength of 120kg/mm<SP>2</SP>, and
     improves the clamping force. The metal piece is made
     of cast iron, it can be formed in an integrated manner
     to embody the lightweight structure.
     COPYRIGHT: (C)1995,JPO
IC   ICM  C22C037-00
     ICS  C21D005-00; E04B001-38; F16B005-06

L69  ANSWER 12 OF 29  JAPIO  COPYRIGHT 2002 JPO
ACCESSION NUMBER:        1994-182499    JAPIO
TITLE:                   COOLING ROLL IN CONTINUOUS CASTING APPARATUS
                         AND MANUFACTURE THEREOF
INVENTOR:                SASAKI KUNIMASA; WAKIYAMA YOICHI; MATSUMOTO TAKAHIRO;
                         TANAKA KISABURO; YAMAMOTO KEIICHI
PATENT ASSIGNEE(S):      MITSUBISHI HEAVY IND LTD
PATENT INFORMATION:

     PATENT NO       KIND   DATE         ERA     MAIN IPC
     ------------------------------------------------------
     JP 06182499      A      19940705    Heisei  B22D011-06

APPLICATION INFORMATION
     STN FORMAT:         JP 1992-342410        19921222
     ORIGINAL:           JP04342410            Heisei
PRIORITY APPLN. INFO.:   JP 1992-342410      19921222
SOURCE:                  PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                         Applications, Vol. 1994
AN   1994-182499    JAPIO
AB   PURPOSE: To provide a cooling roll and a manufacturing
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method thereof which is little heat **deformation** and can continuously cast a good cast strip.
CONSTITUTION: This **cooling** roll has three layer structure of a rigid material 51, a material 53 for **cooling** metallurgically joined to the outside thereof and a heat resistant material 54 electrodeposition-coated on the outer peripheral surface thereof. The rigid material 51 is **made** of **austenitic** stainless **steel** and the material 53 for **cooling** is **made** of Cu or Cu **alloy** and the heat resistant material 54 is **made** of Ni or this **alloy** or Co or this **alloy**.
In the inner part of the rigid material 51, partitioned walls 61, 62 and tubular partitioned wall 63 are fitted. At both end parts of the rigid material 51, hollow shafts 52 rotary- driven are combined with bolts 52a after shrinkage-fitting. In the inner part of the material 53 for **cooling**, **cooling** holes 57, 58 for flowing **coolant** are bored over the whole periphery so as to extend in the shaft direction of the roll. The **cooling** holes 57, 58 are connected with flowing passage for **coolant formed** with the partitioned walls 61, 62 and the tubular partitioned wall 63 through **cooling** passages 57a, 58a.

IC ICM B22D011-06

L69 ANSWER 13 OF 29 JAPIO COPYRIGHT 2002 JPO

ACCESSION NUMBER: 1994-172864 JAPIO
TITLE: HEAT TREATMENT **METHOD** OF **METAL** DUPLEX TYPE DAMPING **STEEL** SHEET
INVENTOR: ISAYAMA TOMOAKI; FUJIWARA MASARU; HIGO YUICHI
PATENT ASSIGNEE(S): NISSHIN STEEL CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 06172864	A	19940621	Heisei	C21D009-00

APPLICATION INFORMATION
STN FORMAT: JP 1992-340932 19921130
ORIGINAL: JP04340932 Heisei
PRIORITY APPLN. INFO.: JP 1992-340932 19921130
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1994

AN 1994-172864 JAPIO

AB PURPOSE: To prevent the separation between the joined **steel** sheets and to eliminate the development of **deformation** of the material caused by the strain in heat treatment at the time of **manufacturing** a circular saw base material, etc., from a **metal** duplex type damping **steel** sheet joined by **forming** metallurgical joining as the main joining factor with diffusion between the piled **steel** sheets and an insert **metal**, which is uniformly distributed between these sheets.
CONSTITUTION: After executing solution treatment by heating the **metal** duplex type damping **steel** sheet having 0.5-50% area of the joined part in the **austenitic** range for few min, this **steel** sheet is dipped into a **quenching** oil and drawn up from the **quenching** oil in the temp. range from just above the starting point of **martensitic** transformation to the completing point of **martensitic** transformation of the **metal** duplex type damping **steel** sheet. Thereafter, immediately, the **martensitic** transformation is completed to finish the **quenching** in the condition of fastening the

metal duplex type damping **steel** sheet from both surface sides. If necessary tempering of the **metal** duplex type damping **steel** sheet whose **quenching** has finished is further, executed in the condition of fastening from bath the surface sides.

IC ICM C21D009-00
ICS C21D006-00

L69 ANSWER 14 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1991-122214 JAPIO
TITLE: HEAT TREATMENT OF **ALLOY STEEL** FOR STRUCTURE
INVENTOR: MIURA HIROSHI
PATENT ASSIGNEE(S): MUSASHI SEIMITSU IND CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 03122214	A	19910524	Heisei	C21D008-00

APPLICATION INFORMATION
STN FORMAT: JP 1989-22024 19890131
ORIGINAL: JP01022024 Heisei
PRIORITY APPLN. INFO.: JP 1989-22024 19890131
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1991

AN 1991-122214 JAPIO

AB PURPOSE: To impart the hardness suitable for machining to a gear blank material by warm forging a preform blank material to **form** the gear blank material and maintaining the entire part at a uniform temp., then subjecting the blank material to controlled **cooling** to transform the material into a stable structure and **cooling** the material with air.
CONSTITUTION: The preform blank material **made** of an **alloy steel** for structure is heated B to the temp. (about 950°C) suitable for warm forging and is subjected to the warm forging C to **form** the gear blank material 1. The gear blank material 1 is then so reheated D as to maintain the temp. of the part 2 of the gear blank material 1 where the plastic **deformation** is large at nearly the same temp. as the temp. of the part 3 where the plastic **deformation** is small. Further, the gear blank material 1 is **cooled** E down to about 550°C under about 60°C/min speed control and is thereby so controlled as to transform the **austenite** of the structure thereof to pearlite and **ferrite**. The material is **cooled** F with air down to room temp. Then, the gear blank material 1 having the hardness suitable for machining of the post stage is obtd.

IC ICM C21D008-00
ICS C21D009-32

L69 ANSWER 15 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1990-294450 JAPIO
TITLE: DIE **STEEL** FOR MOLDING PLASTICS AND ITS **MANUFACTURE**
INVENTOR: MORIYAMA YASUSHI; KAKO KATSUO; YAMAGUCHI TAKASHI
PATENT ASSIGNEE(S): JAPAN CASTING & FORGING CORP
PATENT INFORMATION:

PATENT NO KIND DATE ERA MAIN IPC

JP 02294450	A	19901205	Heisei	C22C038-00

APPLICATION INFORMATION
STN FORMAT: JP 1989-112880 19890502
ORIGINAL: JP01112880 Heisei
PRIORITY APPLN. INFO.: JP 1989-112880 19890502
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1990
AN 1990-294450 JAPIO
AB PURPOSE: To secure the prescribed hardness in the die **steel** and to improve its **deformation** resistance, weld cracking resistance, etc., at the time of working by subjecting a **steel** having specified contents of Mn, Mo, V, Ni, Al, etc., to hot **forming** and thereafter executing forced **cooling** and annealing under specified conditions.
CONSTITUTION: A **steel** having the chemical components constituted of, by weight, 0.05 to 0.18% C, <=0.15% Si, 1.5 to 2.5% Mn, <=0.5% Cr, 0.2 to 0.5% Mo, 0.2 to 0.7% V, 2.5 to 3.5% Ni, 0.5 to 1.5% Al and the balance **Fe** with inevitable impurities is subjected to hot **forming** . The **steel** is subjected to forced **cooling** from 900 to 1100°C and is thereafter annealed at 500 to 650°C. By this treatment, the structure substantially constituted of **bainite** is **formed** and fine carbon nitride and intermetallic compounds are precipitated to regulate the hardness to the range of 35 to 45HRC. The **steel** has excellent machinability, wear resistance, etc., and is applicable to a **metal** pattern for molding plastics.

IC ICM C22C038-00
ICS B29C033-38; C21D006-00; C22C038-46

L69 ANSWER 16 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1990-199334 JAPIO
TITLE: TORSION BAR **MADE** OF SHAPE-MEMORY **ALLOY**
INVENTOR: TANAHASHI HIROYUKI; YAMADA HIROYUKI; MARUYAMA TADAKATSU; OTSUKA HIROAKI
PATENT ASSIGNEE(S): NIPPON STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 02199334	A	19900807	Heisei	F16F001-14

APPLICATION INFORMATION
STN FORMAT: JP 1989-17723 19890130
ORIGINAL: JP01017723 Heisei
PRIORITY APPLN. INFO.: JP 1989-17723 19890130
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1990
AN 1990-199334 JAPIO
AB PURPOSE: To **make** a **cooling process** unnecessary and to enable use in a wide range of temperature by constituting a shape-memory **alloy** with a specific **martensite** transformation start temperature so that shape memory effect is expressed in the circumferential direction of a bar shaped member.
CONSTITUTION: As a shape-memory **alloy**, for example, **Fe** -32Mn-6Si and so forth are used and those with the **martensite** transformation start temperature of above -10°C under 50°C

utilizing non-thermal elastic **martensite** transformation are used. This shape-memory **alloy** is so constituted that the shape memory effect is expressed in the circumferential direction of a bar shaped member. When the **martensite** transformation start temperature is on the side of the **temperature lower** than -10°C, stress to induce the **martensite** phase is increased, initial plastic **deformation** becomes difficult and a general-purpose characteristic of a torsion bar is spoiled. Also, when the **martensite** transformation start temperature is higher than 50°C, influence on the shape memory effect of the **martensite** phase **generated** by **cooling** can not be ignored.
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IC ICM F16F001-14
ICS C22C019-03; F03G007-06

L69 ANSWER 17 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1989-173787 JAPIO
TITLE: HERMETICALLY SEALED VESSEL AND **MANUFACTURE** THEREOF
INVENTOR: OTA HARUYOSHI
PATENT ASSIGNEE(S): NIPPON DEMPA KOGYO CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 01173787	A	19890710	Heisei	H05K005-06

APPLICATION INFORMATION
STN FORMAT: JP 1987-334647 19871228
ORIGINAL: JP62334647 Showa
PRIORITY APPLN. INFO.: JP 1987-334647 19871228
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1989

AN 1989-173787 JAPIO

AB PURPOSE: To heat a cover or a ring to a **temperature lower** than the transformation point of the **alloy** of the cover or ring so as to obtain a hermetic sealing for a long time by a **method** wherein a quartz hermetically sealed vessel is provided with a cover or a periphery which is **formed** of a unidirectional thermoelastic type **martensite** and provided with a ring **formed** of a unidirectional thermoelastic type **martensite** , and a spacer is provided to the opening of the cover.
CONSTITUTION: A cylindrical cover 31 with a bottom is **formed** of a unidirectional thermoelastic type **martensite alloy** which is composed of 61% **iron**, 28% manganese, 6% silicon, and 5% chrome by weight percentage, and a base 32 is attached to a lead wire 35 through a stem 33 and a **compression** glass 34. After the base 32 is placed at the opening of the cover 31, the cover 31 is heated at a temperature within the range of a specified transformation point of a **martensite alloy** to induce a thermoelastic **deformation** so as to seal the cover 31 hermetically with the base 32.
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IC ICM H05K005-06
ICS F16J015-04; G01D011-24; G04G003-00; H03H009-02

L69 ANSWER 18 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1988-221025 JAPIO
TITLE: COMPOSITE CYLINDER WITH ABRASION AND CORROSION RESISTANCE

INVENTOR: MARUTA KENJI; OKITSU TOSHIO
PATENT ASSIGNEE(S): HITACHI METALS LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 63221025	A	19880914	Showa	B29C045-62

APPLICATION INFORMATION
STN FORMAT: JP 1987-53105 19870310
ORIGINAL: JP62053105 Showa
PRIORITY APPLN. INFO.: JP 1987-53105 19870310
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1988
AN 1988-221025 JAPIO

AB PURPOSE: To prevent the occurrence of the crack in the operation of padding weld and to improve its working life by a **method** in which an intermediate plastic material is welded by powder padding on the inner surface of the base material, and further on said materials, a padding material containing hard particles and being excellent in abrasion and corrosion resistance is welded by powder padding.
CONSTITUTION: **Austenite** stainless **steel** is welded by powder padding as an intermediate plastic material 5 on the inner surface of the **steel** base material 4 such as structural carbon **steel**, Cr **steel**, Cr-Mo **steel** and Ni-Cr-Mo **steel**, etc. Further on said materials, an **alloy** in which the hard particles of 10∼50% by volume ratio composed of one or more kinds of the carbide of elements of groups IVA, VA and VIA of the periodic table are mixed with the **alloy** particles composed of 0.6∼1.0% C, 2.0∼5.0% Si, 2.0∼4.0% B, 16∼18% Cr, 3∼6% **Fe**, the balance Ni and impurity elements by weight ratio, and are dispersed therein, welded by powder padding as an abrasion and corrosion resistive materials 1, and 6. When such **austenite** stainless **steel** is used as an intermediate plastic material, since its thermal expansion (shrinkage) coefficient is large, the difference of shrinkage amount of padded layers becomes small, and since the plastic **deformation** is apt to occur halfway in **cooling**, said **deformation** easily follows the shrinkage, whereby the occurrence of the cracks in the padded layers is prevented.

IC ICM B29C045-62
ICS B29C047-66

L69 ANSWER 19 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1988-202420 JAPIO
TITLE: CYLINDER FOR PLASTIC MOLDING EQUIPMENT
INVENTOR: TAKIGAWA HIROSHI; SHIMAMOTO AKIRA; KOTAKANE MASAAKI; HAYASHIDA KEIICHI
PATENT ASSIGNEE(S): KOBE STEEL LTD
NIPPON KOSHUHA KOGYO KK
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 63202420	A	19880822	Showa	B29C047-66

APPLICATION INFORMATION
STN FORMAT: JP 1987-36534 19870218
ORIGINAL: JP62036534 Showa
PRIORITY APPLN. INFO.: JP 1987-36534 19870218

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1988

AN 1988-202420 JAPIO

AB PURPOSE: To prevent the **deformation** of aback **metal,** the cracking of lining **alloy,** the separation of faying surface and the like from occurring by a **method** wherein the inner peripheral surface of a cylinder is **made** of corrosion resisting-wear resisting **alloy** consisting of specified components by means of hot isostatic pressing **method,** and the back **metal made** of hot mold **steel,** the thermal expansion coefficient and high-temperature hardness of which are specified values, and at the same time consisting of mixed composition of upper **bainite** and pearlite, is **formed** on the outer peripheral side of the cylinder.

CONSTITUTION: The inner peripheral surface of a cylinder for a plastic molding equipment is **made** of corrosion resisting-wear resisting **alloy,** which consists of 0.5∼1.5wt.% carbon, 1.0∼2.0wt.% silicon, 0.5∼2.5wt.% boron, 10∼20wt.% nickel, 20∼30wt.% chromium, 10∼20wt.% tungsten, 0.5∼2.0wt.% copper, the balance being cobalt and inevitable impurities by means of hot isostatic pressing (HIP) **method,** and the back **metal made** of hot mold **steel,** the thermal expansion coefficient of which is 12×10<SP>-6</SP>∼15×10<SP>-6</SP>/°C and high-temperature hardness of which is HV 350 or higher at 500°C and at the same time which consists of mixed composition of upper **bainite** and pearlite, is **formed** on the outer peripheral side of the cylinder. In this case, in order to turn the structure of **steel** material of the back **metal** into the composite structure of upper **bainite** and pearlite, the **cooling** speed after HIP is controlled. Thus, even when the back **metal** expands, the separation of faying surface, cracks and the like are hard to develop, since the amount of expansion is small at the transformed part and, in addition, the pearlitic structure absorbs the amount of expansion at the **bainite** transformed part.

IC ICM B29C047-66
ICS B29C045-62

L69 ANSWER 20 OF 29 JAPIO COPYRIGHT 2002 JPO

ACCESSION NUMBER: 1988-131849 JAPIO
TITLE: CYLINDER OF INTERNAL COMBUSTION ENGINE
INVENTOR: YAMAGATA YUTAKA
PATENT ASSIGNEE(S): YAMAHA MOTOR CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 63131849	A	19880603	Showa	F02F001-08

APPLICATION INFORMATION
STN FORMAT: JP 1986-275402 19861120
ORIGINAL: JP61275402 Showa
PRIORITY APPLN. INFO.: JP 1986-275402 19861120
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1988

AN 1988-131849 JAPIO

AB PURPOSE: To suppress **deformation** of liner and reduce the man-hours for **processing** by casting cylinder liner **made** of cast **iron** of **austenite** type in the cylinder body of aluminum **alloy** in such a way as in a single piece.

CONSTITUTION: A cylinder liner 3 **made** of cast **iron** of **austenite** type is cast in the cylinder body 2 of aluminum **alloy** in such a way as in a single piece. This lessens the difference in thermal expansion between the cylinder body and the cylinder liner, which ensures that the cylinder liner has less bore **deformation** at the time of cylinder **cooling** to lead to elimination of necessity for genuine roundness **processing**.

IC ICM F02F001-08

L69 ANSWER 21 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1986-232068 JAPIO
TITLE: ARC WELDING
INVENTOR: OI TOSHITSUGU; KATO NOBORU
PATENT ASSIGNEE(S): MITSUI ENG & SHIPBUILD CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 61232068	A	19861016	Showa	B23K009-23

APPLICATION INFORMATION
STN FORMAT: JP 1985-73718 19850408
ORIGINAL: JP60073718 Showa
PRIORITY APPLN. INFO.: JP 1985-73718 19850408
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1986
AN 1986-232068 JAPIO
AB PURPOSE: To suppress the increase in local hardness and to perform good welding with less residual stress by swinging an arc in the welding line direction in the magnetic field and by-eliminating local over-heating and thermal inclination after building up the **metal** virtually including carbon powders on the arc surface of a cast **iron** member.
CONSTITUTION: A buildup welding 1a is performed with the electrode 2 **made** of the **metal** virtually including no carbon and of Ni or Ni based **alloy** on the welding surface of a cast **iron made** member 1. In case of magnets 4, 5 being approached to this welding zone, an arc 3 is moved before and behind in the welding line direction in case of the welding current being AC and to the built-up zone in case of DC. The local overheating of the weld zone is prevented and the thermal gradient with the peripheral side is eliminated. The **generation** of **martensite** layers is controlled by the fact that there is no **generation** of the high hardness ledeburite due to the overheating and rapid **cooling** and that there is less temp. gradient. A good welding without any **deformation** is therefore performed because of no welding cracks and less residual stress.

IC ICM B23K009-23
ICS B23K009-08

L69 ANSWER 22 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1985-056017 JAPIO
TITLE: **PRODUCTION** OF THICK **STEEL** PLATE HAVING EXCELLENT **LOW- TEMPERATURE** TOUGHNESS
INVENTOR: YOSHIE ATSUHIKO; ONOE YASUMITSU; MORIYAMA YASUSHI
PATENT ASSIGNEE(S): NIPPON STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 60056017	A	19850401	Showa	C21D008-02

APPLICATION INFORMATION
STN FORMAT: JP 1983-164117 19830908
ORIGINAL: JP58164117 Showa
PRIORITY APPLN. INFO.: JP 1983-164117 19830908
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1985
AN 1985-056017 JAPIO
AB PURPOSE: To **produce** a thick **steel** plate having excellent low-tem. toughness with less internal defects by subjecting a billet to rough hot rolling and force **cooling** under specific conditions and subjecting the rolled material to hot finish rolling in the state of having a temp. difference between the surface layer of said material and the central part.
CONSTITUTION: A billet or **steel ingot** is heated to the Ac<SB>3</SB> point or above and is thus **made austenite** then the billet or **ingot** is subjected to rough rolling at about 0∼80% draft. The rolled **steel** is **cooled** by force **cooling**, upon ending of the rough rolling, until the average temp. of the **steel** plate falls down to the Ar<SB>3</SB> point+100°C to **cool** and harden the surface part. The average **cooling** rate in the stage of force **cooling** is **made** >=3°C/sec when the thickness of the roughly rolled material is <50mm, >=2°C/sec when 50∼100mm and >=0.6°C/sec when >=100°C. The **steel** plate is then subjected to hot finish rolling at about >=40% draft in the state of having a temp. difference between the surface layer part of the roughly rolled material and the central part thereof. The **deformation** resistance by rolling is thus **made** large in the surface layer part and small in the central part and therefore the rolling strain in the finish rolling is concentrated to the central part, by which defects such as porosity, etc. are press-stuck and the internal quality of the central part is improved.

IC ICM C21D008-02

L69 ANSWER 23 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1985-009864 JAPIO
TITLE: **PRODUCTION** OF SUPERELASTIC SPRING AND USING **METHOD** THEREOF
INVENTOR: SAWADA KAZUO; HAYASHI KAZUHIKO
PATENT ASSIGNEE(S): SUMITOMO ELECTRIC IND LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 60009864	A	19850118	Showa	C22F001-10

APPLICATION INFORMATION
STN FORMAT: JP 1983-116557 19830628
ORIGINAL: JP58116557 Showa
PRIORITY APPLN. INFO.: JP 1983-116557 19830628
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1985
AN 1985-009864 JAPIO
AB PURPOSE: To **produce** a superelastic spring member having

resilience by **forming** and restraining an **alloy** which causes a thermoelastic type **martensite** transformation to a spring shape at the adequate temp. above the inverse transformation temp. and **cooling** the **alloy** after heating and holding to and at an adequate temp.
CONSTITUTION: An **alloy** which causes a thermoelastic type **martensite** transformation is **formed** to a desired spring shape in a temp. region above the inverse transformation temp. and below the max. temp. at which said **alloy generates** stress-induced **martensite** without plastic **deformation.** The **formed** body is restrained in said shape and thereafter the body is heated and held to and at the temp. region of the inverse transformation temp. +300°C∼ the inverse transformation temp. +450°C and is then **cooled** down to the temp. between the inverse transformation temp. and the max. temp. at which the stress-induced **martensite** can be **generated** without the above-mentioned plastic **deformation.** A superelastic spring member which has resilence and has an extremely high rate of recoverable **deformation** is thus obtd. An **alloy** consisting of 55∼ 58wt% Ni and the balance Ti or the **alloy** in which a part of Ti or Ni is substd. with **Fe,** Co, Zr, V, Cu, Al, etc. within 2% is adequately usable for the above-mentioned **alloy.**

IC ICM C22F001-10
ICS C22C019-03

L69 ANSWER 24 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1984-136422 JAPIO
TITLE: **PREPARATION** OF ROD **STEEL** AND WIRE MATERIAL HAVING SPHEROIDAL STRUCTURE
INVENTOR: KANBARA SUSUMU; SUDO CHUZO; AIHARA KENJI
PATENT ASSIGNEE(S): SUMITOMO METAL IND LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 59136422	A	19840806	Showa	C21D008-06

APPLICATION INFORMATION
STN FORMAT: JP 1983-8585 19830121
ORIGINAL: JP58008585 Showa
PRIORITY APPLN. INFO.: JP 1983-8585 19830121
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1984

AN 1984-136422 JAPIO
AB PURPOSE: To shorten the treating time required in the spheroidizing annealing of carbide to a large extent in **preparing** rod **steel** and a wire material, by re-raising a **steel** temp. by **processing** heat **generated** during hot **processing** while applying controlled **cooling** to the heated **steel** or holding the same to a constant temp. after rolling.
CONSTITUTION: **Steel** capable of containing **alloying** elements such as Si, Mn or the like and containing 2% or less C is heated to an Ac<SB>1</SB> temp. or more and thereafter subjected to hot rolling for applying **deformation.** In this case, the hot rolled **steel** is **cooled** to an over-**cooling** **austenite** temp. region, that is, a temp. region ranging from the Ac<SB>1</SB> temp. or less to an Ar<SB>1</SB> temp. prior to finish rolling and succeedingly subjected to finish rolling to apply plastic

deformation of 10% or more thereto. By this **method,** the perlite or **bainite deformation** of **steel** after finish rolling is promoted to **form** said strcuture and, at the same time, the rolled **steel** is permitted to again reach a temp. region of an Ac<SB>3</SB> temp. ∼Ac<SB>1</SB>-100°C or more. Thereafter, the **steel** heated to the aforementioned temp. is **cooled** at a **cooling** speed of 100°C/min or less in a temp. region reaching 500°C to coagulate carbide to obtain rod **steel** or a wire material each having a spheroidal structure.
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IC ICM C21D008-06
ICS B21B003-00

L69 ANSWER 25 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1984-053623 JAPIO
TITLE: **MANUFACTURE** OF HIGH-**ALLOY** **AUSTENITIC** STAINLESS **STEEL** BILLET
INVENTOR: MATSUZAKI MINORU; HASEGAWA MAMORU; KAWASAKI TATSUO; NUKUI TERUO
PATENT ASSIGNEE(S): KAWASAKI STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 59053623	A	19840328	Showa	C21D008-00

APPLICATION INFORMATION
STN FORMAT: JP 1982-163079 19820921
ORIGINAL: JP57163079 Showa
PRIORITY APPLN. INFO.: JP 1982-163079 19820921
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1984

AN 1984-053623 JAPIO

AB PURPOSE: To obtain the titled billet while preventing cracking during rolling without adding any special element by soaking a high-**alloy** **austenitic** stainless **steel** **ingot** contg. Cr and Ni, and starting rolling at a specified surface temp.
CONSTITUTION: An **ingot** or a continuous billet of high-**alloy** **austenitic** stainless **steel** contg. 16∼26% Cr and 12∼22% Ni is soaked at 1,100∼1,300°C. The **steel** surface is **cooled** by air **cooling** or water **cooling** to regulate the surface temp. to <=950°C, and rolling is started. Since the upper limit of the surface temp. is 950°C where the **deformability** has not been restored yet, internal cracking which causes defects is prevented during rolling. Accordingly, the **product** yield of **steel** billets are be improved.
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IC ICM C21D008-00
ICA C22C038-40

L69 ANSWER 26 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1983-141547 JAPIO
TITLE: MATERIAL FOR LEAD FRAME
INVENTOR: YAHAGI SHINICHIRO
PATENT ASSIGNEE(S): DAIDO STEEL CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC

JP 58141547	A	19830822	Showa	H01L023-48

APPLICATION INFORMATION
STN FORMAT: JP 1982-24826 19820218
ORIGINAL: JP57024826 Showa
PRIORITY APPLN. INFO.: JP 1982-24826 19820218
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1983.
AN 1983-141547 JAPIO
AB PURPOSE: To obtain the lead frame material having excellent corrosion resistance and plating property.
CONSTITUTION: The material consists of an **alloy** in which either one or two kinds of Cu or Ni are **made** contain by 1∼17% (where Cu is limited to 5% or Ni to 15%) as the total sum in case of two kinds and the remainder is **Fe** substantially. When Cu exceeds 5%, the hot workability of the material is degraded, cracks are easy to be **generated** on forging and blooming rolling, and there is difficulties in the **manufacture** of a board material. When Ni exceeds 15% and Ni+Cu exceed 17%, the transformation of **austenite** ← →**ferrite** is **generated** at a comparatively **low temperature** (such as 300°C or less), and transformation is often **generated** in the lead frame material due to heating (a **forming** temperature of plastic) in case of the assembly of a device. When the transformation has an effect on the **deformation** of a punched **product**, the dimension accuracy of the lead frame is degraded, and the lead frame cannot be assembled automatically.

IC ICM H01L023-48
ICA C22C038-00

L69 ANSWER 27 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1982-031474 JAPIO
TITLE: **MANUFACTURE** OF STRUCTURE RESISTANT TO STRESS CORROSION CRACKING
INVENTOR: MASAOKA ISAO; IMAI KATSUYUKI
PATENT ASSIGNEE(S): HITACHI LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 57031474	A	19820219	Showa	B23K009-04

APPLICATION INFORMATION
STN FORMAT: JP 1981-43005 19810323
ORIGINAL: JP56043005 Showa
PRIORITY APPLN. INFO.: JP 1981-43005 19810323
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1982
AN 1982-031474 JAPIO
AB PURPOSE: To prevent the back side part from causing stress corrosion cracking by build up welding the back of the surface of a **metallic** structure exposed to a corrosive atmosphere by giving temperature difference from the surface and giving **compression** plastic **deformation** to the back side.
CONSTITUTION: An unpenetrated groove opening 3 is provided on the back of the surface of a **product made** of **austenitic** stainless **steel** which is in contact with a corrosive atmosphere. The groove opening 3 is build up welded as shown by 5 while water-**cooling** the surface 2 to cause temperature difference between the

surface 2 and the back. By this operation, **compression** plastic **deformation** is given to the back side so that it becomes less than the limit stress of stress corrosion cracking or **compression** stress. In the case of butt welding, the back side is build up welded over a wider area than thermally influenced part of the butt welding while **cooling** the surface 2 exposed to a corrosive atmosphere. Thus, temperature difference is caused between the surface and the back and **compression** plastic **deformation** is given.

IC ICM B23K009-04
ICS B23K031-00

L69 ANSWER 28 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1980-038957 JAPIO
TITLE: **AUSTENITIC** STAINLESS CAST **STEEL**
INVENTOR: IWABUCHI YOSHITAKA; TERAJIMA EISAKU
PATENT ASSIGNEE(S): JAPAN STEEL WORKS LTD:THE
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 55038957	A	19800318	Showa	C22C038-40

APPLICATION INFORMATION
STN FORMAT: JP 1978-111755 19780913
ORIGINAL: JP53111755 Showa
PRIORITY APPLN. INFO.: JP 1978-111755 19780913
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1980

AN 1980-038957 JAPIO

AB PURPOSE: To control the residual stress of an **austenitic** stainless cast **steel** to a low level and to enhance the intergranular corrosion sensibility resistance thereof by reheating the **steel** to a specified temp. after slowly **cooling** it from the soln. heat treatment temp. or as cast.
CONSTITUTION: An **austenitic** stainless **steel** contg. C<0.12%, Si<2.0%, Mn< 1.5%, Cr 11∼25% and Ni 8∼13% is cast into a large-sized **product**, which is then reheated to 650∼850°C as cast or after soln. heat treatment at 1050°C and slow **cooling**. In spite of large size the cast **steel** **product** has very little residual stress and undergoes no **deformation**. **Metal** carbide is prevented from precipitating at the grain boundaries, thus enhancing the intergranular stress corrosion sensibility resistance.

IC ICM C22C038-40
ICS C21D006-00

L69 ANSWER 29 OF 29 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1979-040312 JAPIO
TITLE: IMPELLER
INVENTOR: WACHI HIROSHI; OGURA SATOSHI; MINATO AKIRA; SATO AKIRA; ASHIDA EIJI; KURODA ATSUHIKO
PATENT ASSIGNEE(S): HITACHI LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 54040312	A	19790329	Showa	F04D029-28

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APPLICATION INFORMATION
     STN FORMAT:          JP 1977-105851        19770905
     ORIGINAL:            JP52105851            Showa
PRIORITY APPLN. INFO.:    JP 1977-105851      19770905
SOURCE:                   PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                          Applications, Vol. 1979
AN   1979-040312    JAPIO
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AB PURPOSE: To prevent the **deformation** of an impeller and use it at **low temperature** and at high temperature, by **making** blades of separation-type hard **alloy steel** and a core plate and side plates of non-separation-type soft **alloy steel.**

CONSTITUTION: The impeller comprises the annular core plate 4, a pair of annular side plates 2 concentrically facing each other across the core plate, and the blades 3 extending between the side plates 2 and the core plate 4. The core plate 4 and the side plates 2 are **made** of SM or SUS 410 non-separation-type soft **alloy steel** of 100 to 200 in Vickers hardness. The blades 3 are **made** of high yielding strength separation-type 13-Cr hard **alloy steel** having a Vickers hardness above 240 and containing Mo and Nb. The blades 3 are welded to the core plate 4 and the side plates 2 by an **alloy** having its first layer of **ferrite**-containing **austenite** and the other layers of **austenite**


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IC   ICM  F04D029-28
     ICS  F04D029-02
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=> d L70 1-18 ti

L70 ANSWER 1 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **METHOD** OF **MANUFACTURING LOW-TEMPERATURE** EXPANSION **ALLOY** SHEET SUPERIOR IN ETCHING PROPERTY

L70 ANSWER 2 OF 18 JAPIO COPYRIGHT 2002 JPO
TI ALUMINUM **ALLOY** MATERIAL EXCELLENT IN **LOW TEMPERATURE** CREEP CHARACTERISTICS, ITS **MANUFACTURE**, AND ALUMINUM **ALLOY PRODUCT**

L70 ANSWER 3 OF 18 JAPIO COPYRIGHT 2002 JPO
TI ALUMINUM-**ALLOY** CASE MATERIAL FOR ENCLOSED-TYPE RECTANGULAR CELL, EXCELLENT IN FORMABILITY AND CREEP RESISTANCE, ITS **MANUFACTURE**, ALUMINUM-**ALLOY** CASE FOR ENCLOSED-TYPE RECTANGULAR CELL USING THE CASE MATERIAL, AND ENCLOSED-TYPE RECTANGULAR CELL USING THE CASE

L70 ANSWER 4 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **PRODUCTION** OF AL-SI-**FE** SERIES **ALLOY**

L70 ANSWER 5 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **PRODUCTION** OF DOUBLE PHASE ALUMINUM-SILICON-**IRON** SERIES **ALLOY**

L70 ANSWER 6 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **PRODUCTION** OF GALVANNEALED HIGH STRENGTH **COLD ROLLED STEEL** SHEET EXCELLENT IN FORMABILITY

L70 ANSWER 7 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **METAL** FOIL FOR TAB TAPE HAVING HIGH YOUNG'S MODULUS AND HIGH YIELD STRENGTH AND ITS **PRODUCTION**

L70 ANSWER 8 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **METALLIC** FOIL FOR TAB TAPE HAVING HIGH YOUNG'S MODULUS AND HIGH YIELD STRENGTH AND ITS **PRODUCTION**

L70 ANSWER 9 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **PRODUCTION** OF HIGH MN NONMAGNETIC **STEEL** EXCELLENT IN LOCAL **DEFORMABILITY**

L70 ANSWER 10 OF 18 JAPIO COPYRIGHT 2002 JPO
TI ALUMINUM **ALLOY** FOR NEGATIVE PRESSURE CAN, ITS **MANUFACTURE** AND NEGATIVE PRESSURE CAN BODY

L70 ANSWER 11 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **PRODUCTION** OF **FE**-CO SOFT-MAGNETIC MATERIAL

L70 ANSWER 12 OF 18 JAPIO COPYRIGHT 2002 JPO
TI SHAPE MEMORY STAINLESS **STEEL** AND SHAPE MEMORY **METHOD** THEREFOR

L70 ANSWER 13 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **PRODUCTION** OF **IRON**-COBALT SINTERED **ALLOY**

L70 ANSWER 14 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **METHOD** FOR **COOLING METALLIC** STRIP

L70 ANSWER 15 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **METHOD** FOR ANNEALING FOIL OF HARDLY REDUCIBLE **METAL** HAVING HIGH MELTING POINT

L70 ANSWER 16 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **MANUFACTURE** OF TUBULAR MATERIAL FOR CASTING MOLD FOR ELECTROMAGNETIC AGITATION AND CONTINUOUS CASTING OF **STEEL**

L70 ANSWER 17 OF 18 JAPIO COPYRIGHT 2002 JPO
TI **COOLING** BODY FOR MOLTEN **METAL** QUICK **COOLER**

L70 ANSWER 18 OF 18 JAPIO COPYRIGHT 2002 JPO
TI WEAR RESISTANT AND HIGH MAGNETIC PERMEABILITY **ALLOY** FOR MAGNETIC RECORD REGENERATING HEAD, ITS **MANUFACTURE** AND MAGNETIC RECORD REGENERATING HEAD

=> d L70 1,6-9,11-14,17-18 ibib abs ind

L70 ANSWER 1 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 2001-038404 JAPIO
TITLE: **METHOD** OF **MANUFACTURING** **LOW-TEMPERATURE** EXPANSION **ALLOY** SHEET SUPERIOR IN ETCHING PROPERTY
INVENTOR: HAYAFUJI TETSUNORI; MISHIMA SETSUO
PATENT ASSIGNEE(S): HITACHI METALS LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2001038404	A	20010213	Heisei	B21B003-02

APPLICATION INFORMATION
STN FORMAT: JP 1999-216079 19990730

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     ORIGINAL:              JP11216079          Heisei
PRIORITY APPLN. INFO.:      JP 1999-216079     19990730
SOURCE:                     PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                            Applications, Vol. 2001
AN   2001-038404    JAPIO
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AB PROBLEM TO BE SOLVED: To obtain superior etching properties by blooming mainly through plastic elongation **deformation steel ingot** by **ingot making method** or slab by continuous casting **process** in its main primary dendrite direction and further by hot **rolling** and **cold rolling** in the same **deformation** direction.
SOLUTION: The main primary dendrite means the primary dendrite in the division of the largest volume when **steel ingot** or slab interior as solidified is divided in areas whose primary dendrite direction is same or almost same as each other. With a rectangular parallelopiped **steel ingot**, the dendrite with both sides to **form** thickness as the starting point is the main dendrite, and the thickness direction or similar direction is the direction of the primary dendrite. It is ideal to equalize the primary dendrite direction and plastic elongation **deformation** direction, but accurate identification is not always necessary. It is preferably 25° or less, more preferably 18° or less, and most preferably 10° or less.
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IC ICM B21B003-02
ICS **C21D009-46; C22C038-00**; H01J009-14; H01J029-07

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L70  ANSWER 6 OF 18  JAPIO  COPYRIGHT 2002 JPO
ACCESSION NUMBER:           1999-193419    JAPIO
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TITLE: **PRODUCTION** OF GALVANNEALED HIGH STRENGTH **COLD ROLLED STEEL** SHEET EXCELLENT IN FORMABILITY
INVENTOR: TAMURA YUKIAKI; IWAI TAKAFUSA; OKANO YOICHIRO
PATENT ASSIGNEE(S): KOBE STEEL LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 11193419	A	19990721	Heisei	**C21D009-46**

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APPLICATION INFORMATION
     STN FORMAT:            JP 1997-369317          19971229
     ORIGINAL:              JP09369317              Heisei
PRIORITY APPLN. INFO.:      JP 1997-369317     19971229
SOURCE:                     PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined
                            Applications, Vol. 1999
AN   1999-193419    JAPIO
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AB PROBLEM TO BE SOLVED: To **produce** a galvannealed high strength **cold rolled steel** sheet capable of hot rolling in a temp. region where **deformation** can easily be done and also having low yield ratio and excellent formability.
SOLUTION: In hot-rolling a **steel** having a composition consisting of, by mass, 0.10-0.25% C, <=0.50% Si, 1.0-3.0% Mn, <=0.010% S, <=0.10% Al, and the balance **Fe** with inevitable impurities, finish rolling is completed at a finishing temp. higher than the Ar<SB>3</SB> point and coiling is performed at >700°C coiling temp. The resultant hot rolled **steel** plate is acid-pickled and **cold-rolled** into **steel** sheet. Subsequently, the galvannealing is applied to the **steel** sheet by means of a continuous hot dip galvanizingline. At this time, the **steel** sheet is heated to a

temp. between the Ac<SB>1</SB> point and 850°C for >=10 sec, **cooled** down to plating temp. at >=10°C/sec average **cooling** rate, hot-dip-galvanized, and then subjected to **alloying** treatment at 450-600°C.
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IC ICM **C21D009-46**
ICS **C22C038-00; C22C038-04; C22C038-38;** C23C002-06; C23C002-28

L70 ANSWER 7 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1994-100983 JAPIO
TITLE: **METAL** FOIL FOR TAB TAPE HAVING HIGH YOUNG'S MODULUS AND HIGH YIELD STRENGTH AND ITS **PRODUCTION**
INVENTOR: NISHIMURA SATORU; SHIODA KOSAKU; ONO TAKAHIDE; ENDO MICHIO
PATENT ASSIGNEE(S): NIPPON STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 06100983	A	19940412	Heisei	**C22C038-00**

APPLICATION INFORMATION
STN FORMAT: JP 1992-252895 19920922
ORIGINAL: JP04252895 Heisei
PRIORITY APPLN. INFO.: JP 1992-252895 19920922
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1994

AN 1994-100983 JAPIO

AB PURPOSE: To **produce** a **metal** foil excellent in lead **deformation** resisting- characteristic and heat resisting strength characteristic as a lead foil for TAB.
CONSTITUTION: An **alloy** having a composition consisting of, by weight, 20-95% Cu, 0.3-11% Al, 0.05-3.0% Mn, 0.005-3.5% Ti, 0.5-10% Cr, 0.001-1.5% Mo, and the balance **Fe** with inevitable impurities is melted and cast, which is hot-rolled at 700-1000°C into a **metal** plate of 1.0-8mm plate thickness. This **metal** plate is subjected to primary **cold rolling** at 50-95% draft, to annealing at 800-1000°C, and then to secondary **cold rolling** at 1-70% draft. The resulting sheet is further subjected to solution heat treatment at 700-1000°C, to rapid **cooling**, and successively to aging treatment at 350-650°C. By this **method**, the **metal** foil wherein the aspect ratio of crystalline grain size and sheet thickness are regulated to <=20 and <=80μm, respectively, can be **produced**.
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IC ICM **C22C038-00**
ICS **C22C009-00; C22C038-16; C22F001-08;** C23C028-02; H01L021-60

L70 ANSWER 8 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1994-081058 JAPIO
TITLE: **METALLIC** FOIL FOR TAB TAPE HAVING HIGH YOUNG'S MODULUS AND HIGH YIELD STRENGTH AND ITS **PRODUCTION**
INVENTOR: NISHIMURA SATORU; SHIODA KOSAKU; ONO TAKAHIDE
PATENT ASSIGNEE(S): NIPPON STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 06081058	A	19940322	Heisei	**C22C009-00**

APPLICATION INFORMATION
STN FORMAT: JP 1992-232369 19920831
ORIGINAL: JP04232369 Heisei
PRIORITY APPLN. INFO.: JP 1992-232369 19920831
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1994

AN 1994-081058 JAPIO

AB PURPOSE: To **produce** a **metallic** foil having superior lead **deformation** resistance and heat resisting strength characteristics required of lead foil for TAB.
CONSTITUTION: A molten **metal** having a composition consisting of, by weight, 20-95% Cu, 0.0005-1.0% Co, 0.005-3.5% Ti, 0.5-10% Cr, 0.001-1.5% Mo, and the balance **Fe** with inevitable impurities is cast into a **metal** plate of 0.5-8mm plate thickness at (100 to 50000)°C/sec solidification and **cooling** rate. This **metal** plate is subjected to primary **cold rolling** at 50-95% draft, to annealing at 800-1000°C, to secondary **cold rolling** at 5-70% draft, and successively to aging treatment at 350-650°C, by which the aspect ratio of crystalline grain size and sheet thickness are regulated to <=20 and <=80μm, respectively. By this **method**, the **metallic** foil minimal in anisotropy of characteristics, excellent in lead **deformation** resistance and heat resistance, and having high Young's modulus and high yield strength can be provided.

IC ICM **C22C009-00**
ICS **C21D008-00**; **C22C038-00**; **C22C038-28**; **C22F001-08**; C23C028-02

L70 ANSWER 9 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1992-143213 JAPIO
TITLE: **PRODUCTION** OF HIGH MN NONMAGNETIC **STEEL** EXCELLENT IN LOCAL **DEFORMABILITY**
INVENTOR: TONE SHOJI; IKEDA SOICHI
PATENT ASSIGNEE(S): KOBE STEEL LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 04143213	A	19920518	Heisei	**C21D006-00**

APPLICATION INFORMATION
STN FORMAT: JP 1990-268721 19901005
ORIGINAL: JP02268721 Heisei
PRIORITY APPLN. INFO.: JP 1990-268721 19901005
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1992

AN 1992-143213 JAPIO

AB PURPOSE: To **produce** a high Mn nonmagnetic **steel** material excellent in local **deformability** by subjecting an **ingot** of a high-Mn medium-or low-carbon **steel** having a specific composition and reduced in the content of nonmetallic inclusions to hot rolling and then to heat treatment under specific temp. conditions.
CONSTITUTION: A high temp. **ingot** having a composition which contains, by weight, 0.15-0.70% C, 0.10-3.00% Si, and 12-30% Mn or further contains one or >=2 kinds among 0.05-3.00% Ni, 0.05-8.00% Cr, and

0.05-3.00% Mo or one or >=2 kinds among Ni, Cr, Mo, each in the above content, <0.0030% Ca, and 0.05-3.00% rare earth elements and in which the relationship between the contents of Mn and C satisfies 60×C%+Mn%>=36% and cleanliness with respect to nonmetallic inclusions is regulated to <=0.03% is hot-rolled and worked into a plate, etc. This plate is heated up to 850-1050°C and then air-**cooled** or water- **cooled**, by which the high Mn nonmagnetic **steel** material remarkably improved in local **deformability** and causing no cracks even if subjected to severe **cold working** can be obtained.

IC ICM **C21D006-00**
ICS **C21D009-00; C22C038-00; C22C038-04**
ICA **C21D008-02**

L70 ANSWER 11 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1991-158417 JAPIO
TITLE: **PRODUCTION** OF **FE**-CO SOFT-MAGNETIC MATERIAL
INVENTOR: ISHIDA MASAYOSHI
PATENT ASSIGNEE(S): KAWASAKI STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 03158417	A	19910708	Heisei	**C21D008-12**

APPLICATION INFORMATION
STN FORMAT: JP 1989-296187 19891116
ORIGINAL: JP01296187 Heisei
PRIORITY APPLN. INFO.: JP 1989-296187 19891116
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1991
AN 1991-158417 JAPIO
AB PURPOSE: To effectively control the occurrence of brittleness while obviating the necessity of batch **processing**, such as water **quenching**, and to **produce** continuously an **Fe**-Co soft-magnetic material by subjecting an **Fe**-Co **alloy steel** slab to hot rolling at specific temp.
CONSTITUTION: A slab of an **Fe**-Co **alloy steel** containing 25-65wt.% Co is **formed** into a sheet **metal** by means of hot **rolling** and **cold rolling**. At this time, the final pass in hot rolling is initiated at >=630°C plate temp. and completed at <=550°C, or, a **cooled** hot rolled plate after hot rolling is reheated up to >=630°C and rolling is initiated without delay and completed at <=550°C. Since high-degree plastic **deformation** and high **cooling** velocity are obtained as the result of both procedures mentioned above, superior result can be obtained with increasing rolling reduction.

IC ICM **C21D008-12**
ICS **C22F001-10**
ICA **C22C019-07; C22C038-00; C22C038-10**

L70 ANSWER 12 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1990-301542 JAPIO
TITLE: SHAPE MEMORY STAINLESS **STEEL** AND SHAPE MEMORY **METHOD** THEREFOR
INVENTOR: TAKEMOTO TOSHIHIKO; KINUGASA MASAHIRO; TANAKA TERUO; IGAWA TAKASHI

PATENT ASSIGNEE(S): NISSHIN STEEL CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 02301542	A	19901213	Heisei	**C22C038-00**

APPLICATION INFORMATION
STN FORMAT: JP 1989-121220 19890515
ORIGINAL: JP01121220 Heisei
PRIORITY APPLN. INFO.: JP 1989-121220 19890515
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1990
AN 1990-301542 JAPIO
AB PURPOSE: To obtain a stainless **steel**-type shape memory **alloy** excellent in corrosion resistance by subjecting a shape memory stainless **steel** having a specific composition in which elements for improving corrosion resistance are added to hot **rolling**, to **cold rolling**, and to annealing treatment, allowing the above **steel** to memorize the worked shape successively **deforming** the above into the desired shape, and then carrying out heating and **cooling**.
CONSTITUTION: As a stainless **steel**-type shape memory **alloy** excellent in corrosion resistance, a stock having a composition which consists of, by weight, <0.1% C, 3-6% Si, 6-15% Mn, <7% Ni, >10-17% Cr, 0.02-0.15% N, 6-10% Co, and the balance **Fe** and in which the value of D represented by an equation I is regulated to >=-26 or a stock having a composition which further contains one or >=2 kinds selected from the group consisting of <2% Mo, <2% Cu, and 0.05-0.8% each of Nb, V, Zr, and Ti and in which the value of D represented by an equation II is regulated to >=-26 is used. The above stock is **cold -worked** into a prescribed shape, annealed, and allowed to memorize the worked shape, and then, the above stock is subjected to secondary **deformation** into the desired shape at a temp. of the room temp. or below and is further heated up to >=100°C and then returned to the room temp., by which a shape memory effect can be **produced**.

IC ICM **C22C038-00**
ICS **C21D008-00; C22C038-52**

L70 ANSWER 13 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1989-039304 JAPIO
TITLE: **PRODUCTION** OF **IRON**-COBALT SINTERED **ALLOY**
INVENTOR: YAMAGISHI WATARU
PATENT ASSIGNEE(S): FUJITSU LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 01039304	A	19890209	Heisei	B22F003-24

APPLICATION INFORMATION
STN FORMAT: JP 1987-195882 19870805
ORIGINAL: JP62195882 Showa
PRIORITY APPLN. INFO.: JP 1987-195882 19870805
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1989
AN 1989-039304 JAPIO

AB PURPOSE: To improve dimensional accuracy and yield by annealing an **iron**-cobalt sintered **alloy** at the specific temp. lower than the sintering temp. after sintering and sizing-treating the **alloy**, successively rapid-**cooling** and **cold-working**.
CONSTITUTION: The sintered matérial of **iron**-cobalt series **alloy** is sizing-treated to correct **deformation** of warp, etc. Next, the sintered material is annealed at the temp. which is lower than the sintering temp. and higher than the transformation temp. of α.γ phase. After becoming the room temp. by rapid-**cooling**, various kinds of **cold workings**, such as boring, groove cutting, are executed. By this **method**, electro-magnetic parts having high accuracy can be **produced** with **iron**-cobalt sintered **alloy**.

IC ICM B22F003-24
ICS H01F001-22
ICA **C22C001-04; C22C033-02**

L70 ANSWER 14 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1988-227726 JAPIO
TITLE: **METHOD** FOR **COOLING** **METALLIC** STRIP
INVENTOR: SHIRAISHI NORIHISA; ADACHI KAZUNARI; SHIBUYA SATOSHI; HIRAI KOICHI
PATENT ASSIGNEE(S): KAWASAKI STEEL CORP
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 63227726	A	19880922	Showa	**C21D009-573**

APPLICATION INFORMATION
STN FORMAT: JP 1987-248150 19871002
ORIGINAL: JP62248150 Showa
PRIORITY APPLN. INFO.: JP 1986-242069 19861014
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1988
AN 1988-227726 JAPIO
AB PURPOSE: To prevent the **deformation** of a **metallic** strip in the **cooling process** by slowly **cooling** the strip by mists in a specified temp. range, and rapidly **cooling** the strip in the temp. range below the above-mentioned temp. range when the strip continuously heat-treated in a heating furnace is **cooled**
.
CONSTITUTION: The **metallic** strip of a **cold-rolled steel** sheet, a tinplate master sheet, a galvanized master sheet, a stainless **steel** sheet, etc., are continuously heated in a heating furnace such as a continuous annealing furnace, and then **cooled** to <=400°C. In this case, the strip is slowly mist-**cooled** at the controlled liq. droplet void of 0.5×10<SP>-4</SP>∼1×10<SP>-3</SP> expressed by (water flow rate in mist)/(air flow rate in mist) in the transition b.p. range higher than 400°C, and the strip is rapidly **cooled** by sprayed water or the strongly mist-**cooling** in the temp. range lower than 400°C. As a result, the **deformation** of the **metallic** strip due to the **cooling** from a high temp. can be prevented.

IC ICM **C21D009-573**

L70 ANSWER 17 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1987-045454 JAPIO
TITLE: **COOLING** BODY FOR MOLTEN **METAL** QUICK **COOLER**
INVENTOR: TOMITA TOSHIRO; OKAMOTO ATSUKI
PATENT ASSIGNEE(S): SUMITOMO METAL IND LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 62045454	A	19870227	Showa	B22D011-06

APPLICATION INFORMATION
STN FORMAT: JP 1985-186992 19850826
ORIGINAL: JP60186992 Showa
PRIORITY APPLN. INFO.: JP 1985-186992 19850826
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1987
AN 1987-045454 JAPIO
AB PURPOSE: To stably **produce** a thin **metallic** sheet **product** having excellent sheet thickness accuracy by **forming** a **cooling** body of an **alloy** contg. Co and Cr at a specific ratio each.
CONSTITUTION: The **cooling** body 1 of a molten **metal** quick **cooler** is **made** of the **alloy** contg. >=50%∼<65% Co and 5∼15% Cr and the balance substantially constituted of **Fe**. Then the coefft. of linear expansion thereof exhibits an extremely low value and the **cooling** body has the strength and other characteristics necessary as a material for the molten **metal cooling** body. The **deformation** of the **cooling** body is decreased and the **production** of the extra- thin **metallic** strip 4 satisfying dimensional tolerance is **made** possible without executing **cold rolling**.
COPYRIGHT: (C)1987,JPO&Japio
IC ICM B22D011-06
ICS **C22C019-07**

L70 ANSWER 18 OF 18 JAPIO COPYRIGHT 2002 JPO
ACCESSION NUMBER: 1986-034160 JAPIO
TITLE: WEAR RESISTANT AND HIGH MAGNETIC PERMEABILITY **ALLOY** FOR MAGNETIC RECORD REGENERATING HEAD, ITS **MANUFACTURE** AND MAGNETIC RECORD REGENERATING HEAD
INVENTOR: MASUMOTO RYO; MURAKAMI YUETSU
PATENT ASSIGNEE(S): RES INST ELECTRIC MAGNETIC ALLOYS
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 61034160	A	19860218	Showa	**C22C038-08**

APPLICATION INFORMATION
STN FORMAT: JP 1984-152783 19840725
ORIGINAL: JP59152783 Showa
PRIORITY APPLN. INFO.: JP 1984-152783 19840725
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1986
AN 1986-034160 JAPIO
AB PURPOSE: To **manufacture** a high magnetic permeability **alloy** superior in magnetic characteristic in AC magnetic field and

wear resistance, easy for forging and favorable to magnetic record regeneration head, by heat treating Ni-**Fe alloy** contg. Zn, Cd, etc. under a specified condition.
CONSTITUTION: Ni-**Fe alloy** contg. 30∼90% Ni, 0.001∼5% total of one or two kinds of Zn, Cd, and the balance **Fe**, or said **alloy** further contg. respective quantities of Cu, W, Ta, the other auxiliary components is melted in vacuum or nonoxidizing atmosphere. The molten **metal** is cast in mold, the **ingot** is **deformed** to sheet by forging hot **rolling, cold rolling**, etc. The sheet is heated to 600°C∼m.p. for 1min∼100hr in vacuum or nonoxidizing atmosphere such as Ar, H<SB>2</SB>, successively **cooled** from the temp. to normal temp. at 100∼1°C/sec rate. Or said sheet is heated at <=600°C for >=1min to **manufacture** the titled **alloy** having >=5,000G saturated magnetic flux density and superior wear resistance.
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IC ICM **C22C038-08**
ICS **C21D006-00; C22C038-60**; G11B005-127; G11B005-255

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L79 ANSWER 1 OF 11 METADEX COPYRIGHT 2002 CSA
AN 2001(4):56-288 METADEX
TI Austenite-ferritic corrosion-resistant steel for high-strength wire.
AU Grachev, S.V. (Ural State Technical University); Mal'tseva, L.A.; Mal'tseva, T.V.
SO Metallovedenie i Termicheskaya Obrabotka Metallov (2000) 11, 6-9, Photomicrographs, Graphs, 6 ref.
ISSN: 0026-0819
DT Journal
CY Russian Federation
LA Russian
AB Steel of 03Kh13N10K5M3Yu2T kind with deformation-unstable austenite is investigated with the purpose of determination of phase composition and fine structure. The mechanical tests showed that steel can be used in manufacturing the thin and very thin wire with diameter of 0.15-0.8 mm, possessing high strength at sufficient plasticity. The optimum treatment of wire includes water quenching from 1000 deg C, cold plastic deformation and aging at 500 deg C for 1 h. It is revealed that the strain martensite has high tendency to strain aging.
CC 56 Thermal Treatment
CT Journal Article; Austenitic stainless steels: Heat treatment; Ferritic stainless steels: Heat treatment; Dual phase steels: Mechanical properties; Water quenching: Temperature effects; Plastic deformation: Microstructural effects; Strain aging: Microstructural effects; Fine structure; Phases (state of matter); High strength low alloy steels: Metal working; Cold working
ALI 03Kh13N10K5M3Yu2T CCA: SALHS
ET Al*Co*Cr*Mo*Ni*Ti; Al sy 6; sy 6; Co sy 6; Cr sy 6; Mo sy 6; Ni sy 6; Ti sy 6; Cr13Ni10Co5Mo3Al2Ti; Cr cp; cp; Ni cp; Co cp; Mo cp; Al cp; Ti cp

L79 ANSWER 2 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1999(7):31-3202 METADEX
TI Structure and properties of cold-worked stainless steels alloyed with nitrogen.
AU Berns, H. (Ruhr-Universitat); Duz', V.A. (Academy of Sciences of Ukraine); Gavriljuk, V.G. (Academy of Sciences of Ukraine); Petrov, Y.N. (Academy of Sciences of Ukraine); Tarasenko, A.V. (Academy of Sciences of Ukraine)
SO Metal Physics and Advanced Technologies (1998) 17, (2), 199-214, Graphs, 8 ref.
ISSN: 1024-9087
DT Journal
CY United Kingdom
LA English
AB The effects of the chemical compositions on the structure, mechanical and corrosive properties of cold-drawn austenitic stainless steel wire are studied by means of Mossbauer spectroscopy, transmission electron microscopy (TEM), mechanical tests and measurements of the anodic current density-potential curves. The textured dual-phase structure of deformed steels was obtained due to the presence of some amount of delta -ferrite in the initial structure and strain-induced martensitic transformation. It is shown that delta -ferrite undergoes dynamic recovery and recrystallization during plastic deformation and the thin bands of the deformed delta -ferrite are elongated along the wire axis. The alternating plates of strain-induced martensite and retained austenite are located on a scale of about 100 nm in the elongated former austenitic grains. Such a fine heterophase structure prevents localisation of plastic deformation during mechanical tests of the cold-drawn wire and provides good values of plasticity whereas the high strength of the cold-drawn steel is provided by N. It is shown that appropriate alloying (Mo, Si, Cu) results in the high corrosion resistance in 1 n H2SO4 and 3% NaCl solutions.
CC 31 Mechanical Properties; 35 Corrosion; 12 Crystal Properties
CT Journal Article; Austenitic stainless steels: Mechanical properties; Corrosion resistance: Composition effects; Elongation: Microstructural effects; Reduction of area: Microstructural effects; Plasticity: Microstructural effects; Recrystallization: Deformation effects; Ferrite: Deformation effects; Martensite: Deformation effects; Plastic deformation
ET N; Mo; Si; Cu; H*O*S; H2SO4; H cp; cp; S cp; O cp; Cl*Na; NaCl; Na cp; Cl cp

L79 ANSWER 3 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1997(7):14-247 METADEX
TI Strain induced martensite formation and its effect on strain hardening behavior in the cold drawn 304 austenitic stainless steels.
SO Scripta Materialia (1997) 36, (1), 99-104, Numerical Data, Diffraction Patterns, Photomicrographs, Graphs, 22 ref.
ISSN: 1359-6462
DT Journal
CY United States
LA English
AB Strain induced martensite (SIM, alpha ' martensite) in the present cold drawn austenitic stainless steels, AISI 304 and AISI 304/Cu, nucleates mainly at the intersections of the mechanical twins rather than epsilon -martensite. The present results are attributed to the suppression of the formation of epsilon -martensite due to the increase of stacking fault energy which arise from the heat generated during high speed drawing and, for AISI 304/Cu, the additional effect of Cu additions. The strain hardening behavior of the present steels is strongly related to the microstructural evolution accompanied by SIM transformation: mechanical twinning at small strains, the formation and the growth of alpha '-martensite at intermediate strains, and plastic deformation and

concurrent dynamic recovery in SIM at large strains.
CC 14 Structural Hardening; 11 Constitution; 13 Lattice Defects; 52 Working (Forming)
CT Journal Article; Austenitic stainless steels: Structural hardening; Wire: Structural hardening; Strain hardening: Microstructural effects; Martensitic transformations: Deformation effects; Wire drawing; Deformation mechanisms; Twinning: Deformation effects; Slip: Deformation effects; Stacking fault energy: Alloying effects; Copper: Alloying additive
ALI 304 CCA: SSA
ET Cu

L79 ANSWER 4 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1997(3):52-447 METADEX
TI Strain-induced martensite formation in stainless steel AISI 302.[A formacao de martensita durante trefilacao do aco inoxidavel ABNT 302.].
AU Tessler, M.B. (ABM); Falleiros, I.G.S. (EPUSP)
SO Associacao Brasileira de Metalurgia e Materiais. Rua Antonio Comparato, 218, Cx. Postal 42081, Sao Paulo, CEP 04605, Brazil. 1995. 477-485, Graphs, Photomicrographs, 8 ref.
Conference: 49th International Congress on the Technology of Metals and Materials. Vol. III. Research on the Microstructure of Metals and Materials; Physical Metallurgy (49 deg Congresso Internacional de Tecnologia Metalurgica e de Materiais. Vol. III. Pesquisa da Microestrutura de Metais e Materiais; Metalurgia Fisica), Sao Paulo, Brazil, Oct. 1994
DT Conference Article
CY Brazil
LA Portuguese
AB Strain induced martensite transformation in stainless steels is technologically very important. Its occurrence during cold working causes significant changes in mechanical and magnetic properties and in corrosion resistance. Stainless steel where strain induced martensite transformation occurs are called metastable. These steels have high mechanical strength. AISI 302 investigated here, for instance, has wide application in spring fabrication. In this case, high strength is due to high strain hardening in wire drawing process, as a result of martensite formation. Martensite fraction in AISI 302 increases steadily with deformation level. The results of x-ray diffraction and magnetic measurements have shown that martensite content reach about 40% after cold working in wire drawing. The results of mechanical testing have shown that work hardening at wire drawing temperature is higher than at room temperature. Work hardening exponent changes with deformation, and this is explained by martensite formation during the test. Pitting corrosion tests have shown that corrosion resistance decreases with the deformation level in wire drawing.
CC 52 Working (Forming); 35 Corrosion
CT Conference Paper; Austenitic stainless steels: Metal working; Cold working; Wire drawing; Martensite: Deformation effects; Strain hardening; Pitting (corrosion); Corrosion resistance
ALI 302 CCA: SSA

L79 ANSWER 5 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1993(1):52-206 METADEX
TI The Cold Forming Behaviour of Stainless Steels. The Effect of Composition and Microstructure. (Retroactive Coverage).[Comportamiento de los Aceros Inoxidables en la Conformacion en Frio. Influencia de su Composicion y Microestructura.].
AU Javier Betanzos, F. (Trefilerias del Norte)
SO PRENSA XXI. Av. Paral.lel 180, 08015 Barcelona, Spain. 1986. 189-210, Graphs, Photomicrographs, 2 ref. Accession Number: 93(1):72-26

Conference: Deformetal/86, Barcelona, Spain, 3-5 Mar. 1986
DT Conference Article
CY Spain
LA Spanish
AB Peculiarities in the process of cold forming fine and coarse wires and rods in stainless steels are described with special reference to problems of lubrication and the high work hardening index of austenitic steels. The effect of composition on austenite stability has been evaluated quantitatively through test which included the measurement of the quantity of martensite produced by deformation. The effects of individual alloying elements on the hardening of austenitic steels with stable and unstable structures were also studied. The influence of microstructure and the loss of ductility at high deformation speeds were investigated.
CC 52 Working (Forming)
CT Conference Paper; Stainless steels: Metal working; Cold working; Strain hardening

L79 ANSWER 6 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1989(9):14-265 METADEX
TI The Strengthening of Austenitic Wires by Cold Forming. (Retroactive Coverage).
AU Schmidt, W.; Domalski, H.H.; Schaffrath, W.
SO Thyssen Edelstahl Tech. Ber. (1986) 12, (1), 101-112
ISSN: 0340-5125
DT Journal
LA German
AB The properties of steel ropes under atmospheric conditions seems to be improved by the application of high-alloyed austenitic steels. In practice maintenance costs have to be minimized. The mechanical properties of several austenitic stainless steels with nitrogen contents up to 0.5% are presented in comparison with those of an unalloyed C steel of the same strength. It is shown that metastable austenitic stainless steels with a partially martensitic structure after cold forming have suitable mechanical properties and therefore good prospects in special sections of rope production. Considering room temperature creep and other mechanical properties, advantages in the load carrying capability of ropes from cold drawn wire-rods are to be expected. For example, the cold drawn, high-strengthened metastable austenitic stainless steel X12CrNi177 ;(Remanit 4310) with an amount of cold formed martensite shows a better elongation than the martensitic structure of the unalloyed C steel (C content 0.70%). The N containing grades X3CrNiMoN17135 (Remanit 4439) and X3CrNiMoNbN2317 (Amagnit 3974) are without any martensitic microstructure even after a 90% reduction in area. These steels have a favourable strength/ductility ratio. Practical rope manufacture tests are to be undertaken. The results of technological tests, e.g. bend and torsion tests, show good prospects for the successful manufacture of high-strength austenitic steel ropes. All test results are compared with those of the well known grade C70. The given properties of the austenitic steels promote a further development in the field of rope manufacture to determine the special conditions which are suitable for these grades. Due to the favourable mechanical properties and lower maintenance costs the application of the high alloyed austenitic steels gives rise to extended considerations for the wire rope production. 13 ref.-AA
CC 14 STRUCTURAL HARDENING
CT Austenitic stainless steels: Mechanical properties; Carbon steels: Mechanical properties; Mechanical properties: Deformation effects; Cold drawing; Ductility; Metastable phases; Microstructure: Deformation effects; Tensile strength; Wire rope: Fabrication
ALI C75 CCA: SCH; X2CrNi18 9, X12CrNi17 7, X5CrNiMo18 10, X3CrNiMoN17 13 5, X3CrNiMoNb23 17 CCA: SSA

ET C; Cr*Ni; Cr sy 2; sy 2; Ni sy 2; CrNi; Cr cp; cp; Ni cp; N; Cr*Mo*N*Ni; Cr sy 4; sy 4; Mo sy 4; N sy 4; Ni sy 4; CrNiMoN; Mo cp; N cp; Cr*Mo*N*Nb*Ni; Cr sy 5; sy 5; Mo sy 5; N sy 5; Nb sy 5; Ni sy 5; CrNiMoNbN; Nb cp; Cr*Mo*Ni; Cr sy 3; sy 3; Mo sy 3; Ni sy 3; CrNiMo; Cr*Mo*Nb*Ni; Nb sy 4; CrNiMoNb

L79 ANSWER 7 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1984(3):56-239 METADEX
TI Strengthening Maraging Steels During Cold Plastic Deformation and Heat Treatment.
AU Butyukov, S.M.; Grachev, S.V.; Rundkvist, N.A.; Dubov, Yu.S.; Ogolikhin, S.A.
SO Metalloved. Term. Obrab. Met. (Apr. 1983) (4), 46-49
ISSN: 0026-0819
DT Journal
LA Russian
AB Possible production of high-strength cold drawn wire from industrial maraging steel with less alloyed Co and Mo was explored. Wire from N18K9M5T steels (N16K5M5T2, M18K13M5T, N13K8M8T) was melted in a vacuum-induction furnace and forged to blanks from which 6 mm dia. rolled wire was produced. Wire of varying dia. was made from this product by softening. Results showed that the high plasticity of carbonless martensite Fe-Ni-Co-Mo-Ti steels makes it possible to cold deform with a high total cogging (to 99%)-an effective way to increase strength properties. Steel chemical composition had little effect on strengthening or deformation. Temperature decrease in hardening steel whose austenitic zone shows no intermetallic phase insures an additional strength increase to 300 MPa after deformation and aging. Hardening, cold plastic deformation and aging can increase strength in maraging steels with total Co and Mo content 10-18% to 3200-3800 MPa.-K.M.S.
CC 56 THERMAL TREATMENT
CT Maraging steels: Heat treatment; Wire drawing; Strain hardening; Aging (artificial); Tensile strength
ALI N18K9M5T, N13K8M8T, EP637 CCA: SAHM
ET Co; Mo; K*N; N18K; N cp; cp; K cp; N16K; N13K; Co*Fe*Mo*Ni*Ti; Co sy 5; sy 5; Fe sy 5; Mo sy 5; Ni sy 5; Ti sy 5; Fe-Ni-Co-Mo-Ti

L79 ANSWER 8 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1981(11):56-1039 METADEX
TI Thermomechanical Treatment of Aging Austenitic Steels.
AU Grachev, S.V.; Baraz, V.R.
SO 154-162. Accession Number: 81(11):72-491
Conference: Papers, Simpozion 1979 Romania, Vol. 1, Bucharest, Romania, 24-26 Sept. 1979
DT Conference
LA Russian
AB Wire (3 mm dia.) of 06Kh15N20M2T1 (ZI97) and 13Kh18N10G3C2M2 (ZI98) alloys was quenched from 1100 deg C, drawn to 2.0 mm dia. (55% reduction) and cold rolled to strip of 0.42 x 4.5 mm cross-section; specimens were aged in the temp. range 200-800 deg C. Relaxation tests show that both alloys have practically the same relaxation stability, both in the original (deformed) and aged condition. However, 06Kh15N20M2T1 alloy, when aged at 800 deg C, is characterized by higher heat resistance. Plastic deformation reduces the elastic modulus of the alloys; the effect is much stronger for 13Kh18N10G3C2M2 alloy in which 50% deformation produces a 16% decrease of elastic modulus as compared to 6% for 06Kh15N20M2T1 alloy. It is found that modulus of elasticity is partially recovered during subsequent heating. The differences in the properties of the austenitic steels investigated are interpreted in terms of chemical composition, structural defects, austenite stability with respect to martensitic transformation

and the nature of the secondary phases precipitating during aging.-V.L.
CC 56 THERMAL TREATMENT
CT Austenitic stainless steels: Heat treatment; Thermomechanical treatment; Modulus of elasticity; Aging; Martensitic transformations
ALI ZI97, ZI98 CCA: SSA
ET Cr*Mo*Ni*Ti; Cr sy 4; sy 4; Mo sy 4; Ni sy 4; Ti sy 4; Cr15Ni20Mo2Ti; Cr cp; cp; Ni cp; Mo cp; Ti cp; C*Cr*Mn*Mo*Ni; C sy 5; sy 5; Cr sy 5; Mn sy 5; Mo sy 5; Ni sy 5; Cr18Ni10Mn3C2Mo; Mn cp; C cp

L79 ANSWER 9 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1981(9):14-406 METADEX
TI The Deformation-Thermal Strengthening of Maraging [Iron-Nickel-Cobalt-Molybdenum] Alloys.
AU Voronin, S.A.; Edneral, A.F.; Kirienko, V.I.; Perkas, M.D.
SO Fiz. Met. Metalloved. (Dec. 1980) 50, (6), 1285-1292
DT Journal
LA Russian
AB A study has been made of the nature of the high-strength state of the martensite in low-C Fe-Ni-Mo alloys (Ni approx = 8, Co approx = 18, Mo 10-14%), of the factors that unfavourably affect the ductility of the alloys, and of the measures that can be taken to minimize this effect by way of deformation and heat treatment. The effect of heating temp. on the solubility of excess Fe7Mo6 phase in austenite was investigated, and the optimal temp. required to secure high ductility after quenching was found. The shape, structure, and distribution of the precipitates after ageing were also determined. It was established that plastic deformation followed by ageing results in the production of a thermally stable microwire having a UTS of 300-400 kgf/mm2 combined with reasonable ductility. To obtain this result, the alloys must be austenitized at a high temp., quenched from the single-phase region, and subjected to cold working (70-99% reduction) before being strengthened by ageing at 500 deg C. 10 ref.-N.V.
CC 14 STRUCTURAL HARDENING
CT Maraging steels: Structural hardening; Aging (artificial); Cold working; Austenitizing; Ductility: Heating effects; Tensile strength: Heating effects; Solubility: Temperature effects; Wire: Structural hardening
ALI N8K18M14,N8K18M12,N8K18M10,N12K18M10 CCA: SAHM
ET C; Fe*Mo*Ni; Fe sy 3; sy 3; Mo sy 3; Ni sy 3; Fe-Ni-Mo; Co; Mo; Fe*Mo; Fe sy 2; sy 2; Mo sy 2; Fe7Mo; Fe cp; cp; Mo cp; K*N; N8K; N cp; K cp

L79 ANSWER 10 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1981(5):72-169 METADEX
TI Recrystallization and Grain Growth of Multi-Phase and Particle-Containing Materials.
AU Hansen, N.; Jones, A.R.; Leffers, T.
SO Riso National Laboratory. Roskilde, Denmark. 1980. Pp 337, 93/4 x 91/4 in., Illustrated
Conference: Roskilde, Denmark, 8-12 Sept. 1980
DT Conference
LA English
AB Contents: W.M. STOBBS, @Patterns of Deformation in Alloys Containing Hard Particles@; A.R. JONES and N. HANSEN, @Recovery Changes Leading to Nucleation of Recrystallization@; I. BAKER and J.W. MARTIN, @Micromechanisms of Recrystallization in Internally Oxidized Copper Crystals@; F.J. HUMPHREYS, @Nucleation of Recrystallization in Metals and Alloys With Large Particles@; R. SANDSTROM, @Criteria for Nucleation of Recrystallization Around Particles@; B. BAY and N. HANSEN, @The Deformed Structure at Grain Boundaries in Aluminum of Commercial Purity and in an Aluminum - Alumina Alloy@; R.D. DOHERTY, @Nucleation of Recrystallization in Single-Phase and Dispersion-Hardened Polycrystalline Materials@; Y. INOKUTI, Y. SHIMIZU, C. MAEDA and H. SHIMANAKA, @Transmission Kossel Study

of the Structure During Secondary Recrystallization in Grain-Oriented Silicon Steel@; R.W. CAHN, @The Effect of Pores on Recrystallization@; E. NES, @Recrystallization in Alloys With Bimodal Particle Size Distributions@; P.L. MORRIS and M.D. BALL, @The Recrystallization of Supersaturated Al - Mn Alloys and Its Inhibition by the Addition of Zirconium@; C. DIALLO and M. MONDINO, @Recrystallization and Precipitation in Al - Mn Alloys as Seen by Internal Friction@; P. FURRER, @Controlling the Annealing Behavior and Grain Size of Aluminum Alloys@; B. ANDERSSON and E. NES, @Nucleation of Recrystallization in a Commercial AlMn Alloy@; R. SANDSTROM, @Recrystallization in the Presence of a Distribution of Coarse Particles@; C.A. ROMANOWSKI and P. COTTERILL, @The Recrystallization Behavior of Hiduminium RR8 - an Aluminum Alloy Containing a Bimodal Particle Size Distribution@; U. LOTTER, W. MUSCHENBORN and E. THIEMANN, @Recrystallization Affected by Precipitation Cold Rolled Microalloyed Deep-Drawing Steels@; S. DERMARKAR and J.L. STRUDEL, @Early Stages of Recrystallization in a Nickel-Base Alloy@; A. PORTER and B. RALPH, @Recrystallization Mechanisms in Wrought Nickel-Base Superalloys@; J.V. BEE, A.R. JONES and P.R. HOWELL, @The Nucleation of Recrystallization in a Powder-Produced Nickel-Base Superalloy@; P.M. HAZZLEDINE, P.B. HIRSCH and N. LOUAT, @Migration of a Grain Boundary Through a Dispersion of Particles@; C.Y. BARLOW and B. RALPH, @Grain Boundary Migration and Cellular Transformations in Nimonic 80A@; P.R. HOWELL and J.V. BEE, @The Interaction of Recrystallization Interfaces With a Dispersion of Gamma Prime in Low-Carbon Astroloy@; I.J. POLMEAR, @Microstructural Changes Associated With Recrystallization in the Heat Affected Zones of Welded Aluminum Alloys@; T. GLADMAN, @The Effect of Second-Phase Particles on Grain Growth@; A.A. HUSSEIN, M.S. SOLIMAN and A.E. EL-MEHAIRY, @Beta Grain Growth and Martensite Plate Thickness in Ternary Aluminum Bronze@; E. HORNBOGEN, @Recrystallization of Coarse Two-Phase Alloys@; B.A. COOKE and B. RALPH, @Recrystallization of Alpha/Beta Brass@; T. SOGABE and S. HORI, @Formation of Recrystallized Microduplex Structure in a Cu - 26Ni - 8Fe Alloy@; T.G. LANGDON, @The Influence of Grain Growth on the Mechanical Properties of Two-Phase Superplastic Alloys@; B. RALPH, C. BARLOW, B. COOKE and A. PORTER, @The Recrystallization of High Peformance Alloys@; R.G. ROWE, @The Effect of Nitrogen Segregation on Normal Grain Growth in Iron - 3% Silicon@; M. STEFAN, G. HATTA and P. ARATO, @On the Secondary Recrystallization of FeNi Alloys@; R. LOMBRY, C. ROSSARD and B.J. THOMAS, @On the Influence of NbC Precipitation on High-Temperature Static Recrystallization of a 347 Grade Stainless Steel@; T.M. WILLIAMS, @Recovery and Recrystallization in Type 316 and FV548 Austenitic Stainless Steels@; A. SZOKEFALVI-NAGY, G. RADNOCZI, A. KELE and I. GAAL, @The Structure of Torsion-Deformed Tungsten Wires@; L. AURAN, H. WESTENGEN and O. REISO, @The Effect of Ternary and Quarternary Additions to Al - 0.17 Wt. - Zr on the Precipitation of Zirconium and Subsequent Effects on Recrystallization@; H. WESTENGEN, L. AURAN and O. REISO, @The Effect of Minor Additions of Transition Elements on the Recrystallization of Commercial Aluminum Alloys@; C.M. SELLARS, @The Influence of Particles on Recrystallization During Thermomechanical Processing@; B. MINTZ, J.R. WILCOX and J.M. ARROWSMITH, @The Influence of Precipitation on Grain Boundary Mobility and the Hot Ductility of Steels@; G. ROBILLER and L. MEYER, @Work Hardening and Softening Behavior of Titanium- and Niobium-Alloyed Steels During Hot Deformation@; L.J. CUDDY, @Austenite Microstructures Developed During Simulated Hot Rolling@; M.F. ASHBY, @The Influence of Particles on Boundary Mobility@.

CC 72 SPECIAL PUBLICATIONS
CT Grain growth; Recrystallization
ET N; I; B; Y; C; H; Al; Mn; P; Al*Mn; Al sy 2; sy 2; Mn sy 2; AlMn; Al cp; cp; Mn cp; U; W; S; T; Cu; Ni; Fe; Fe*Ni; Fe sy 2; Ni sy 2; FeNi; Fe cp; Ni cp; C*Nb; NbC; Nb cp; C cp; O; Zr

L79 ANSWER 11 OF 11 METADEX COPYRIGHT 2002 CSA
AN 1980(6):31-2072 METADEX
TI Properties of Stainless Steels for Spring Production.
AU Baroux, B.; Falanga, A.; Moiron, J.L.; Maitrepierre, P.; Jaumaud, G.
SO Rev. Metall. (Jan. 1979) 76, (1), 27-33
DT Journal
LA French
AB The hardness and residual ductility of cold drawn stainless steel wire depend on the rate of deformation and the susceptibility of the steel to the formation of martensite during cold working. The influence of these parameters was studied by means of torsion tests on nine steels of the AISI 301/302/304 types (basically 18/8 Cr-Ni with varying C and N contents) hardened by commercial drawing to different levels. It was thus possible to identify, of each hardness level required, the steel possessing the best residual ductility. The importance of the level of interstitial elements, C and N, was established, and recommendations were made for a new composition for making stainless steel wire for springs, designated NS21R5.-C.V.
CC 31 MECHANICAL PROPERTIES
CT Austenitic stainless steels: Metal working; Austenitic stainless steels: Mechanical properties; Spring steels: Mechanical properties; Martensitic transformations; Wire drawing; Hardness: Alloying effects; Ductility: Alloying effects; Carbon: Alloying additive; Nitrogen: Alloying additive
ALI 301,302,304 CCA: SSA; NS21R5 CCA: SG
ET Cr*Ni; Cr sy 2; sy 2; Ni sy 2; Cr-Ni; C; N; N*S; NS; N cp; cp; S cp

=> d L81 1-27 all

L81 ANSWER 1 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2002(9):31-3501 METADEX
TI Structural instability of cold worked alloy 304 in 650 deg C service.
AU Krafft, H. (Bechtel)
SO ASM International, Member/Customer Service Center, Materials Park, OH 44073-0002, USA. 2001. 47-50, Numerical Data, 4 ref.
ISSN: 1529-8159
DT Journal
CY United States
LA English
AB A heavily worked 304 stainless steel wire basket recrystallized and distorted while in service at 650 deg C (1200 deg F). This case study demonstrates that heavily cold worked austenitic stainless steel components can experience large losses in creep strength, and potentially structural collapse, under elevated temperature service, even at temperatures more than 300 deg C (540 deg F) below the normal solution annealing temperature. The creep strength of the recrystallized 304/304L steel was more than 1000 times less than that achievable with solution annealed 304H. These observations are consistent with limitations (2000 Addendum to ASME Boiler and Pressure Vessel Code) on the use of cold worked austenitic stainless steels for elevated temperature service.
CC 31 Mechanical Properties
CT Journal Article; Austenitic stainless steels: Mechanical properties; Wire: Mechanical properties; Cold working; Plastic deformation; Solution annealing; Creep strength: Processing effects; Structural integrity: High temperature effects
ALI 304 CCA: SSA
ET F; H

L81 ANSWER 2 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2002(1):31-48 METADEX

TI A research on electroplastic effects in wire-drawing process of an austenitic stainless steel.
AU Yao, K.-F. (Tsinghua University); Wang, J. (Tsinghua University); Zheng, M. (Tsinghua University); Yu, P. (Tsinghua University); Zhang, H. (Tsinghua University)
SO Scripta Materialia (2001) 45, (5), 533-539, Photomicrographs, Graphs, 20 ref.
ISSN: 1359-6462
DT Journal
CY United States
LA English
AB Moving electrons in metal crystals may interact with dislocations therein. Many have extensively studied the effect of high density electric current pulses on plastic deformation and other mechanical properties of metals and alloys. That the flow stress of metals can be reduced by applying high-density current pulses in deformation process is presently, and generally accepted. And this phenomenon is termed the electroplastic effect. Experimental results have revealed that the concurrent application of high-density current pulses during deformation process can reduce deformation stress and brittleness of the metals, improving mechanical properties and changing microstructure and texture. Since deformation stresses required for metalworking, such as rolling or drawing, can be reduced by deforming with current pulses, electroplastic effect can be applied in metal processing. Wire-drawing experiments of the stainless steel of Fe-0.12%C-18%Cr-10%Ni-1%Ti (in wt.%) with current pulses were studied. It was found that the drawing stress was reduced and gamma -> alpha phase transformation was suppressed. However, the relationship between drawing stress drop and accumulated drawing strain and the drawing deformation behavior have not been carefully investigated. In the present work, cold wire drawing of an austenite stainless steel both with and without employing high density current pulses has been carried out with different drawing dies. The influence of high-density current pulses on the drawing deformation behavior has been discussed. (Material used: Fe-0.1%C-18%Cr-9%Ni.)
CC 31 Mechanical Properties; 52 Working (Forming)
CT Journal Article; Ferrous alloys: Mechanical properties; Austenitic stainless steels: Mechanical properties; Plasticity: Processing effects; Tensile strength: Processing effects; Deformation: Processing effects; Cold drawing; Wire drawing; Currents
ET C*Cr*Fe*Ni*Ti; C sy 5; sy 5; Cr sy 5; Fe sy 5; Ni sy 5; Ti sy 5; Fe-0.12%C-18%Cr-10%Ni-1%Ti; C*Cr*Fe*Ni; C sy 4; sy 4; Cr sy 4; Fe sy 4; Ni sy 4; Fe-0.1%C-18%Cr-9%Ni

L81 ANSWER 3 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2001(7):52-1370 METADEX
TI Application of 18KhNAGS precision alloy as materials for mainsprings.
AU Knoroz, M.M. (Vremya (Sankt-Petersburg))
SO Stal' (2001) 1, 77-79, Graphs, 4 ref.
ISSN: 0038-920X
DT Journal
CY Russian Federation
LA Russian
AB Since 1960s, 40KNKhMVTYu and 40KKhNM precision alloys on basis of Co Cr-Ni system were utilized for manufacturing the mainsprings. These alloys are characterized by high properties. However, they are very expensive. In connection with this, other precision alloys of 18KhNAGS grade has been investigated. After quenching, this alloy is characterized by austenite structure. This makes it possible to provide cold rolling with reduction of up to 80%. High elasticity of the cold-rolled alloy is observed after the strengthening tempering. The steel is suitable for manufacturing the

mainsprings of high quality.
CC 52 Working (Forming)
CT Journal Article; Chromium manganese steels: Metal working; Spring steels: Metal working; Cold rolling: Microstructural effects; Tempering; Mechanical properties: Anisotropy; Rolling texture; Crystallography; Wire drawing: Deformation effects; Flattening
ALI 18KhNAGS CCA: SACMN; 40KNKhMVTYu CCA: SACM
ET Cr*Mn*N*Ni*Si; Cr sy 5; sy 5; Mn sy 5; N sy 5; Ni sy 5; Si sy 5; CrNiNMnSi; Cr cp; cp; Ni cp; N cp; Mn cp; Si cp; Al*Co*Cr*Mo*Ni*Ti*W; Al sy 7; sy 7; Co sy 7; Cr sy 7; Mo sy 7; Ni sy 7; Ti sy 7; W sy 7; CoNiCrMoWTiAl; 40CoNiCrMoWTiAl; is; Co is; 40Co; Co cp; Mo cp; W cp; Ti cp; Al cp; Co*Cr*Mo*Ni; Co sy 4; sy 4; Cr sy 4; Mo sy 4; Ni sy 4; CoCrNiMo; 40CoCrNiMo; Co; Cr*Ni; Cr sy 2; sy 2; Ni sy 2; Cr-Ni

L81 ANSWER 4 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2001(5):62-622 METADEX
TI Fabrication and mechanical properties of steel-steel composites.
AU Pugh, M. (University of Canterbury (New Zealand)); Sun, S. (University of Canterbury (New Zealand))
SO Materials Science and Engineering A (2001) 300, (1-2), 135-141, Photomicrographs, Graphs, Numerical Data, 9 ref.
ISSN: 0921-5093
DT Journal
CY Switzerland
LA English
AB Metal matrix composites based on a low carbon steel matrix reinforced with high carbon steel wires have been fabricated by a combined cold and hot rolling process. Both continuously and discontinuously aligned composites have been produced. A subsequent heat treatment allowed the formation of martensitic, bainitic or pearlitic wires in a ferrite predominantly matrix. The optimum wire micro structure giving a composite with high strength and reasonable ductility was found to be bainitic - martensitic wires were found to contain microcracks that gave poor composite strengths and ductilities. The discontinuous wire composites produced similar strengths to the continuous composites only when they were deformed to give a wire aspect ratio greater than 20. The strengths of both types of composites showed a good fit to the rule of mixtures as the volume fraction of fibers was increased.
CC 62 Composites; 31 Mechanical Properties
CT Journal Article; Low carbon steels: Composite materials; High carbon steels: Composite materials; Fiber composites: Fabrication; Rolling; Austempering; Quenching (cooling); Tensile strength: Processing effects; Elongation: Processing effects

L81 ANSWER 5 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2000(6):11-577 METADEX
TI Influence of deformation on the microstructure and transformation temperatures of Fe-Mn-Si-Cr-Ni shape memory alloys.
AU Buono, V.T.L. (Universidade Federal de Minas Gerais); Arruda, G.J. (Centro Tecnologico de Minas Gerais); Andrade, M.S. (Centro Tecnologico de Minas Gerais)
SO Materials Science and Engineering A (15 Dec. 1999) 273-275, 528-532, Photomicrographs, Graphs, 18 ref.
. Switzerland
Conference: ICOMAT 98: International Conference on Martensitic Transformations, S.C. de Bariloche, Argentina, 7-11 Dec. 1998
ISSN: 0921-5093
DT Conference Article
CY Switzerland
LA English

AB The characteristics of the martensitic transformation in a Fe-Mn-Si-Cr-Ni alloy and in a similar alloy containing also Co were investigated in terms of the amount and type of deformation: cold rolling, with 19 and 33% reduction of area, and wire drawing, with 20% reduction of area in the last pass. The temperatures of start and finish of the reverse transformations were measured by dilatometry. The constitution and microstructure of the alloys were characterized by X-ray diffraction, scanning electron microscopy, atomic force microscopy and magnetic force microscopy. The cold forming processes applied to the alloys induced the formation of epsilon and the alpha ' martensites, even when the start temperature of thermal martensite was well below room temperature. An increase of up to 500 K in the characteristic temperatures of the reverse transformation, when compared to thermal martensite, was also observed.
CC 11 Constitution
CT Conference Paper; Ferrous alloys: Phase transformations; Shape memory alloys: Phase transformations; Martensitic transformations: Deformation effects; Cold rolling; Wire drawing
ET Cr*Fe*Mn*Ni*Si; Cr sy 5; sy 5; Fe sy 5; Mn sy 5; Ni sy 5; Si sy 5; Fe-Mn-Si-Cr-Ni; Co

L81 ANSWER 6 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2000(4):31-2158 METADEX
TI The effect of nitrogen on the mechanical behaviour of cold-worked austenitic stainless steel rod.
AU Dailly, R.B. (University of Strathclyde); Hendry, A. (University of Strathclyde)
SO Materials Science Forum (1999) 318-320, 427-436, Photomicrographs, Graphs, 16 ref.
. Switzerland
Conference: High Nitrogen Steels '98: 5th International Conference on High Nitrogen Steels., Espoo; Stockholm, Finland; Sweden, May 24-26 1998; May 27-28 1998
ISSN: 0255-5476
DT Conference Article
CY Switzerland
LA English
AB In the present work a requirement was identified for stainless steel rod with improved surface hardness supported by a strengthened rod core. This geometry is easily utilised in both theoretical modelling and experimental investigation of a solid-state processing route. A method of fabrication was proposed comprising of nitriding of the surface of austenitic steel rod to a controlled depth and subsequent swaging or wire drawing to provide cold deformation. These two steps can be assimilated into a continuous industrial process to produce a composite rod structure with high surface hardness and a strong core.
CC 31 Mechanical Properties
CT Conference Paper; Nitrogenized steels: Mechanical properties; Austenitic stainless steels: Mechanical properties; Rods: Mechanical properties; Surface hardness: Alloying effects; Nitriding; Cold working

L81 ANSWER 7 OF 27 METADEX COPYRIGHT 2002 CSA
AN 2000(3):52-590 METADEX
TI New precision materials for medical equipment.
AU Barseg'yan, L.V. (I.P. Bardin Central Research Institute); Zakharov, E.K.; Nikandrova, E.A.; Plotnikov, A.V.
SO Stal' (Sept. 1999) 9, 71-73, Photomicrographs, 5 ref.
ISSN: 0038-920X
DT Journal
CY Russian Federation
LA Russian

AB Medical materials should be characterized by high corrosion resistance in tissues and media of organism, in physiological salt solutions, and in the sterilizing solutions. Compatibility of the materials with tissues of organism should be provided. Special properties such as high hardness, wear resistance, strength, plasticity etc. are noted. Alloys on basis of cobalt of 40KKhNM type are such materials. High-strength elastic rods, cold-deformed band, and wire are made from the alloys. Special quenching is provided. These alloys were modified, thus, new alloys of 40K27KhNM and 40KKhN10MTYu grades were created. Less expensive 18KhNAGS and 23KhNAGS alloys were developed. The 40Kh13 and 65Kh13, 10Kh13, 0Kh13 steels are also used.
CC 52 Working (Forming)
CT Journal Article; Cobalt base alloys: Metal working; Cold working: Deformation effects; Strain hardening: Microstructural effects; Nickel chromium steels: Metal working; Martensitic stainless steels: Metal working; Tool steels: Metal working; Laminates: Mechanical properties; Bimetals: Electrical properties; Medical equipment: End uses
ALI 40KKhNM CCA: CO; 18KhNAGS CCA: SANC; 23KhNAGS CCA: SANC; 40Kh13 CCA: SS; 63Kh13 CCA: ST
ET Co*Cr*Mo*Ni; Co sy 4; sy 4; Cr sy 4; Mo sy 4; Ni sy 4; CoCrNiMo; 40CoCrNiMo; is; Co is; 40Co; Co cp; cp; Cr cp; Ni cp; Mo cp; Co27CrNiMo; 40Co27CrNiMo; Al*Co*Cr*Mo*Ni*Ti; Al sy 6; sy 6; Co sy 6; Cr sy 6; Mo sy 6; Ni sy 6; Ti sy 6; CoCrNi10MoTiAl; 40CoCrNi10MoTiAl; Ti cp; Al cp; Cr*Mn*N*Ni*Si; Cr sy 5; sy 5; Mn sy 5; N sy 5; Ni sy 5; Si sy 5; CrNiNMnSi; N cp; Mn cp; Si cp; Cr; C*O; CO; C cp; O cp

L81 ANSWER 8 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1997(10):31-4318 METADEX
TI Piano wire of the highest tensile strength steel.
AU Tashiro, . (Nippon Steel)
SO Materia Japan (1996) 35, (11), 1177-1181, Graphs, Numerical Data, Photomicrographs, 48 ref.
ISSN: 1340-2625
DT Journal
CY Japan
LA Japanese
AB The paper reviews strength issues of JIS G3522 cold drawn piano wire of 0.08-10 mm diameter with micro-pearlite structure which contains 0.6% or more carbon, and including chromium, silicon, and manganese as alloy ingredients. Piano wire, also other musical instruments, is used as tension member in suspension bridge main cable, hunger rope, wire rope and many more applications. The tensile strength of steel cord in 1970s was 2.7 Gpa, which has been steadily increasing to 3.6 Gpa at present and due to ever existing demand for high strength steel rod, already research on 4 Gpa class type is underway. Strengthening techniques could be through several alternatives such as: solid solution, cold work hardening, miniaturization of grains, and precipitation strengthening methods. Patenting is used to miniaturize fine pearlite structures, for example in case of zinc patenting 1-3 mm eutectoid steel the strength is 1.3-1.2 Gpa. Electronic microscope photographs for 2 mm patenting steel and 0.2 mm drawn wire are shown with nm resolution. The paper proceeds with providing steel rod manufacturing process including a block diagram, comparison table and graphs of strengthened various steels like eutectoid pearlite, ferrite-martensite binary phase steel, and ferrite single phase.
CC 31 Mechanical Properties; 52 Working (Forming)
CT Journal Article; Wire: Mechanical properties; Steels: Mechanical properties; Tensile strength: Deformation effects; Cold drawing

L81 ANSWER 9 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1995(7):56-527 METADEX

TI An investigation of structure and properties of low carbon Si-Nb dual phase steel.
AU Sui, X.H. (Anshan Iron and Steel); Yao, W.X. (Anshan Iron and Steel); Zhao, X.P. (Anshan Iron and Steel); Li, X.F. (Anshan Iron and Steel)
SO A Collection of Iron and Steel Research
Liaoning Science and Technology Publishing, 108 Beiyima Rd. Heping Chi, Shenyang, 110001, China. 1993. 247-255, Graphs, Photomicrographs, 14 ref.
DT Report
CY China
LA Chinese
AB The effects of various heat treatment regimes on the microstructures and mechanical properties of low carbon Si-Nb dual phase steel have been studied. The results show that the dual phase microstructures composed of ferrite plus island, lamella or interface type martensite (sometimes containing a few bainite) may be obtained in the experimental steels undergoing either intercritical or intermediate quenching treatment in a wide temperature range from 830-960 C. Both the dislocation and twinning type substructures coexist in all the martensite observed. In the microstructures containing lamella martensite obtained in the steel undergoing intermediate quenching treatment the interphase area between ferrite and martensite is larger, thus leading to an ideal combination of strength and toughness. Nevertheless, in the dual phase microstructures containing a few interface type martensite, on account of the existence of fine grain ferrite and martensite, a good combination of mechanical properties is acquired. Steel wire undergoing tempering at 300 C, there appear highly dispersed second phase particles of coherent precipitation so that the toughness of wire is improved with retention of certain strength. The initiation and propagation of cracks during cold drawing process have been investigated. It is found that the steel wire of dual phase structures undergoing either intermediate or intercritical quenching and subsequently cold drawn up to the percentage of reduction from 70-95% is capable of continuous deformation. The microcracks are largely initiated at the interfaces between the nonmetallic inclusions and the matrix. This might be due to the fact that the deformation index of nonmetallic inclusions is rather low, so the interface separation is most likely to occur between matrix and inclusions under the action of uniaxial stress during cold drawing.
CC 56 Thermal Treatment
CT Report; Dual phase steels: Heat treatment; Wire: Heat treatment; Low alloy steels: Heat treatment; Quenching (cooling); Dislocations; Twinning; Lamellar structure; Tempering; Precipitation; Crack propagation; Cold drawing; Deformation; Interfaces; Nonmetallic inclusions
ET Nb*Si; Nb sy 2; sy 2; Si sy 2; Si-Nb; C

L81 ANSWER 10 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1995(7):31-2525 METADEX
TI An investigation of low carbon silicon-niobium dual phase steel wires. II.
AU Yao, W.X. (Anshan Iron and Steel); Zhang, L. (Anshan Iron and Steel); Wang, Q.S. (Northeast University of Technology (China)); Sun, J.L. (Northeast University of Technology (China))
SO A Collection of Iron and Steel Research
Liaoning Science and Technology Publishing, 108 Beiyima Rd. Heping Chi, Shenyang, 110001, China. 1993. 207-213, Graphs, Photomicrographs, 12 ref.
DT Report
CY China
LA Chinese
AB A study has been made of the influence of different compositions, hot-rolling, and heat treatment processes on the micro-structures, mechanical properties, and cold drawing properties of low carbon Si-Nb dual-phase steels containing 0.06-0.09%C, 1.5-1.9%Si, and 0.03-0.05%Nb.

The steel treated by firstly quenching from gamma phase region and then heating to gamma + alpha two-phase region and quenching again (intermediate quenching) had better cold drawing ability than that treated by direct quenching from two phase region after hot rolling (direct quenching), and no further heat treatment was needed when these steels were cold drawn into wires. A complete process of deformation and cracking to fracture was observed by in situ techniques under a HITACHI S-570 scanning electron microscope equipped with tensile accessories. It was found that dislocations piled up on the ferrite-martensite interfaces and ferrite grain boudnaries, that led to the nucleation of cracks and finally to fracture.

CC 31 Mechanical Properties
CT Report; Dual phase steels: Mechanical properties; Wire: Mechanical properties; Low alloy steels: Mechanical properties; Hot rolling; Quenching (cooling); Heating; Drawability; Deformation; Cracking (fracturing); Dislocations; Interfaces; Grain boundaries
ET Nb*Si; Nb sy 2; sy 2; Si sy 2; Si-Nb; C; Si; Nb

L81 ANSWER 11 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1994(4):56-363 METADEX
TI Nitriding of the Deformed Austenitic Steels.[Previously Titled: Nitriding of Deformed Austenitic Steels.].
AU Baraz, V.R. (Kirov Polytechnical Institute); Zavarov, A.S. (Kirov Polytechnical Institute)
SO Physics of Metals and Metallography (Russia) (June 1992) 73, (6), 654-657, Graphs
ISSN: 0031-918X
DT Translation
CY United Kingdom
LA English
AB Previously abstacted from original as item 9302-56-0240. The nature of accelerated nitriding is studied in deformation-aged austenitic steels based on Cr-Ni-Mn. Such treatment gives a significant intensification of the diffusion layer formation. Preliminary plastic deformation, such as drawing, increases the effectiveness of surface saturation by N2. Differences in the phase composition of deformed steels, with stable and unstable gamma -solid solution, do not affect the resulting nitriding. This is due to non-equilibrium gamma - and alpha -phase distributions across the section of cold drawn wire of unstable steels. The strength and fatigue properties of steels after nitriding are determined. Steels 12Kh17N8G, 2S2MF and 13Kh18N10G352M2 were nitrided.
CC 56 Thermal Treatment
CT Translation; Austenitic stainless steels: Heat treatment; High strength low alloy steels: Heat treatment; Nitriding; Fatigue (materials): Heating effects
ALI 12Kh17N8G, 13Kh18N10G3S2M2 CCA: SSA; 2S2MF CCA: SALHS
ET Cr*Mn*Ni; Cr sy 3; sy 3; Mn sy 3; Ni sy 3; Cr-Ni-Mn; N2; Cr17Ni8Mn; Cr cp; cp; Ni cp; Mn cp; Cr*Mn*Mo*Ni; Cr sy 4; sy 4; Mn sy 4; Mo sy 4; Ni sy 4; Cr18Ni10Mn352Mo; Mo cp; Cr*Mn*Mo*Ni*Si; Cr sy 5; sy 5; Mn sy 5; Mo sy 5; Ni sy 5; Si sy 5; Cr18Ni10Mn3Si2Mo; Si cp

L81 ANSWER 12 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1994(1):35-159 METADEX
TI A New Corrosion-Resistant Steel for Medical Instruments.
AU Mikaberidze, M.P. (Academy of Sciences of Georgia); Lordkipanidze, I.N. (Academy of Sciences of Georgia); Ebanoidze, D.D. (Academy of Sciences of Georgia)
NR Book No. 556
SO The Institute of Materials. 1 Carlton House Terrace, London SW1Y 5DB, UK. 1993. 1237-1239. Accession Number: 94(1):72-3

Conference: Progress in the Understanding and Prevention of Corrosion. Vol. II, Barcelona, Spain, July 1993
DT Conference Article
CY United Kingdom
LA English
AB A new Cr-Ni-Mo maraging steel (composition: 0.030% C, 13% chromium, 6.3% nickel, 2% molybdenum, 1% aluminum, 1% copper, 0.8% titanium has been developed. After quenching from 1050 deg C, the steel contains non-carbon martensite and sigma ferrite. The quenched steel is plastic and can be easily deformed. Maximum mechanical properties are attained after aging from 500 deg C for 2 h. Cold-worked wire of diameters 0.2 mm, sigma = 1890 MPa strength, and 60 HRC hardness is achieved after this thermal treatment. Investigations on corrosion resistance revealed high resistance of the steel in banked blood, physiological and tissue solutions, and during disinfection and sterilisation in aggressive media. The steel wire can withstand 20 cycles of disinfection, washing and sterilising. The steel is recommended for producing multiple use microsurgery instruments.
CC 35 Corrosion; 45 Ferrous Alloy Production
CT Conference Paper; Maraging steels: Corrosion; Corrosion resistance; Medical equipment: Materials selection; Mechanical properties; Alloy development; End uses
ALI Fe-0.030C-13Cr-6Ni-2Mop1Al-1Cu-0.8Ti CCA: SAM
ET Cr*Mo*Ni; Cr sy 3; sy 3; Mo sy 3; Ni sy 3; Cr-Ni-Mo; C; C*Cr*Fe*Ni; C sy 4; sy 4; Cr sy 4; Fe sy 4; Ni sy 4; Fe-0.030C-13Cr-6Ni-2; Al*Cu*Ti; Al sy 3; Cu sy 3; Ti sy 3; Al-1Cu-0.8Ti

L81 ANSWER 13 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1993(12):12-1619 METADEX
TI Influence of Vanadium on Features of the Fracture of High-Strength Steel Wire.[Previously Titled: The Effect of Vanadium on the Fracture Characteristics of High Strength Steel Wire.].
AU Baraz, V.R. (Urals Polytechnical Institute); Sokolov, A.A. (Urals Polytechnical Institute); Ishina, E.A. (Urals Polytechnical Institute); Golomazova, T.V. (Urals Polytechnical Institute)
SO Metal Science and Heat Treatment (Russia) (Sept.-Oct. 1991) 33, (9-10), 663-666, Graphs
ISSN: 0026-0673
DT Translation
CY United States
LA English
AB Previously abstracted from original as item 9209-12-1155. Microalloying of type 70 steel with 0.10% V decreased its tendency toward fibrous seam fracturing when it was patented and cold drawn into wire. The V addition produced a relatively fine grain size when the steel was heated to 800-900 deg C. The ultimate strength and reduction-in-area of the type 70 steel were equivalent to that of type 70F (microalloyed with 0.10% V) steel after patenting (austenitizing at 940 deg C and isothermal holding at 480 deg C) and subsequent cold drawing up to 87%. However, the density of 70F steel was higher than type 70 steel after cold working. The positive effect of microalloying the steel with vanadium was attributed to the retardation of both cementite decomposition during drawing of the patented wire and the occurrence of deformation aging.
CC 12 Crystal Properties
CT Translation; High carbon steels: Microstructure; Vanadium steels: Microstructure; Grain size: Alloying effects; Reduction of area: Alloying effects; Tensile strength: Alloying effects; Vanadium: Alloying elements; Microalloying
ALI 70 CCA: SCH; 70F CCA: SAV
ET V; F

L81 ANSWER 14 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1993(2):56-240 METADEX
TI Nitriding of Deformed Austenitic Steels.
AU Baraz, V.R. (Kirov Polytechnical Institute); Zavarov, A.S. (Kirov Polytechnical Institute)
SO Fizika Metallov i Metallovedenie (June 1992) (6), 131-137, Graphs, 10 ref.
ISSN: 0015-3230
DT Journal
CY Russia
LA Russian
AB The nature of accelerated nitriding is studied in deformation-aged austenitic steels based on Cr-Ni-Mn. Such treatment gives a significant intensification of the diffusion layer formation. Preliminary plastic deformation, such as drawing, increases the effectiveness of surface saturation by N2. Differences in the phase composition of deformed steels, with stable and unstable gamma -solid solution, do not affect the resulting nitriding. This is due to non-equilibrium gamma - and alpha -phase distributions across the section of cold drawn wire of unstable steels. The strength and fatigue properties of steels after nitriding are determined. Steels 12Kh17N8G, 2S2MF and 13Kh18N10G352M2 were nitrided.
CC 56 Thermal Treatment
CT Journal Article; Austenitic stainless steels: Heat treatment; High strength low alloy steels: Heat treatment; Nitriding; Fatigue (materials): Heating effects
ALI 12Kh17N8G, 13Kh18N10G3S2M2 CCA: SSA; 2S2MF CCA: SALHS
ET Cr*Mn*Ni; Cr sy 3; sy 3; Mn sy 3; Ni sy 3; Cr-Ni-Mn; N2; Cr17Ni8Mn; Cr cp; cp; Ni cp; Mn cp; Cr*Mn*Mo*Ni; Cr sy 4; sy 4; Mn sy 4; Mo sy 4; Ni sy 4; Cr18Ni10Mn352Mo; Mo cp; Cr*Mn*Mo*Ni*Si; Cr sy 5; sy 5; Mn sy 5; Mo sy 5; Ni sy 5; Si sy 5; Cr18Ni10Mn3Si2Mo; Si cp

L81 ANSWER 15 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1992(10):52-1517 METADEX
TI Void Nucleation and Growth in Dual-Phase Steel Wires.[Nucleazione e Accrescimento dei Vuoti Nei Fili in Acciaio.].
AU Sidjanin, L.; Miyasato, S.
SO Tecnologie del Filo (May-June 1991) 9, (3), 74-80, Photomicrographs, Diffraction patterns, 9 ref.
ISSN: 0392-7954
DT Journal
CY Italy
LA Italian
AB Dual phase ferritic-martensite HSLA steels present improved cold drawn properties if intermediate quenching was applied. Due to the fibrous lath martensite structure in a ferrite matrix, a low void density is obtained. A comparative study on the effect of heat treatment/martensite structure on void density and fracture phenomenon was performed on a steel containing 0.08% carbon, 1.9% Si, 0.32 Mn, sulfur and phosphorus 0.004%, Al 0.033%, nitrogen 0.0015%. Experimental method is described in detail. Intermediate quenching from 1150 deg C in brine followed by an intercritical annealing for 10 min at 910 deg C resulted in a fibrous martensite in a continuous ferrite matrix. Data on structure and mechanical parameters are quoted. Void formation function of deformation was investigated, using SEM techniques. Intermediate annealing gave the highest void density and the lowest strength level, due to the martensite network preventing plastic deformation.
CC 52 Working (Forming)
CT Journal Article; High strength low alloy steels: Metal working; Dual phase steels: Metal working; Wire: Metal working; Cold drawing; Voids: Deformation effects; Strain hardening: Microstructural effects; Formability: Microstructural effects; Fracture strength: Microstructural

effects; Martensite; Grain structure
ALI Fe-0.08C-0.32Mn-0.004P-0.004S-1.9Si-0.033Al-0.0015N CCA: SALHS
ET Si; Mn; Al; C*Al*Fe*Mn*N*P*S*Si; C sy 8; sy 8; Al sy 8; Fe sy 8; Mn sy 8; N sy 8; P sy 8; S sy 8; Si sy 8; Fe-0.08C-0.32Mn-0.004P-0.004S-1.9Si-0.033Al-0.0015N

L81 ANSWER 16 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1992(9):12-1155 METADEX
TI The Effect of Vanadium on the Fracture Characteristics of High Strength Steel Wire.
AU Baraz, V.R. (Urals Polytechnical Institute); Sokolov, A.A. (Urals Polytechnical Institute); Ishina, E.A. (Urals Polytechnical Institute); Golomazova, T.V. (Urals Polytechnical Institute)
SO Metallovedenie i Termicheskaya Obrabotka Metallov (Sept. 1991) (9), 11-13, Graphs, 3 ref.
ISSN: 0026-0819
DT Journal
CY USSR
LA Russian
AB Microalloying of type 70 steel with 0.10% V decreased its tendency toward fibrous seam fracturing when it was patented and cold drawn into wire. The V addition produced a relatively fine grain size when the steel was heated to 800-900 deg C. The ultimate strength and reduction-in-area of the type 70 steel were equivalent to that of type 70F (microalloyed with 0.10% V) steel after patenting (austenitizing at 940 deg C and isothermal holding at 480 deg C) and subsequent cold drawing up to 87%. However, the density of 70F steel was higher than type 70 steel after cold working. The positive effect of microalloying the steel with vanadium was attributed to the retardation of both cementite decomposition during drawing of the patented wire and the occurrence of deformation aging.
CC 12 Crystal Properties
CT Journal Article; High carbon steels: Microstructure; Vanadium steels: Microstructure; Grain size: Alloying effects; Reduction of area: Alloying effects; Tensile strength: Alloying effects; Vanadium: Alloying elements; Microalloying
ALI 70 CCA: SCH; 70F CCA: SAV
ET V; F

L81 ANSWER 17 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1989(1):14-25 METADEX
TI Sigma-Phase Formation in Nitronic 50 and Nitron 50W Stainless Steels.
AU Ritter, A.M.
CS General Electric
SO J. Mater. Sci. (Sept. 1988) 23, (9), 3348-3356
ISSN: 0022-2461
DT Journal
LA English
AB The formation of the sigma -phase has been studied in two heats of a nitrogen-strengthened austenitic stainless steel, Nitronic 50 and Nitronic 50W, a weld filler wire composition. It was found that the presence of cold-work greatly enhanced the rate of sigma precipitation in the temperature range of 600-1000 deg C. The nucleation and growth of the sigma -phase was accompanied by recrystallization of the deformed austenite. The final austenite grain size was generally very small (0.5-4 mu m), since grain growth was inhibited by the intergranular sigma precipitates. Precipitation of M 23 C6 carbides was suppressed by the rapid formation of the sigma -phase. In samples solution annealed prior to ageing, the kinetics of sigma precipitation were much slower, and for a heat containing 0.04 wt.% carbon (Nitronic 50W), the sigma precipitation was retarded by the formatin of intergranular M 23 C6. Grain boundaries in

solution annealed and aged samples of both alloys also contained Z-phase (NbCrN) precipitates, which formed in the range of 700-1000 deg C. Retained delta -ferrite in the Nitronic 50W heat transformed directly to sigma -phase during ageing of the cold-worked specimens, but underwent more complex reactions in the solution annealed plus aged samples. Precipitation sequences at the ferrite/austenite interfaces in these latter specimens varied with ageing temperature. sigma -phase chemistries in all samples were determined in the analytical electron microscope. In the solution-annealed and aged specimens, the sigma -phase chemistries were generally not of equilibrium values, and a wide variation in sigma composition was seen in each sample. In the cold-worked and aged samples, equilibrium sigma chemistries were attained. On comparing data from different samples, compositional changes in the sigma -phase were observed, with Mo increasing and Cr decreasing as ageing temperatures increased. 28 ref.-AA

CC 14 STRUCTURAL HARDENING

CT Austenitic stainless steels: Structural hardening; Precipitation hardening: Deformation effects; Cold working; Solution annealing; Aging (artificial)

ALI Nitronic 50, Nitronic 50W CCA: SSA

ET W; Cr*N*Nb; Cr sy 3; sy 3; N sy 3; Nb sy 3; NbCrN; Nb cp; cp; Cr cp; N cp; Mo; Cr

L81 ANSWER 18 OF 27 METADEX COPYRIGHT 2002 CSA

AN 1987(6):11-694 METADEX

TI Influence of Cold Deformation on Austenitization of Eutectoid Steel. (Translation: MITS BISI 25614).

AU Baranov, A.A.; Kim, I.E.

SO Izv. V.U.Z. Chernaya Metall. (1986) (10), 77-81 (original in Russian) ISSN: 0363-0797

DT Journal; Translation

LA English

AB Metallographic methods were used to investigate the influence of cold deformation on the austenitization of eutectoid steel 80. Annealed testpieces of 8.0 mm diameter wire were used. Complex etching of heat-treated metal enabled the microstructure of solid solutions to be established. Cold deformation leads to nucleation of austenite but retards its growth, so that the temperature range of austenitization of the eutectoid steel with deformation is widened. The carbon content of the formed austenite is below the eutectoid composition and grows with increase in the degree of deformation. The relation between the substructure of austenite and the amount of cementite phase was determined. 8 ref.-P.S.C.

CC 11 CONSTITUTION

CT Carbon steels: Phase transformations; Austenitizing: Deformation effects; Cold working; Nucleation; Crystal growth

ALI 80 CCA: SCH

L81 ANSWER 19 OF 27 METADEX COPYRIGHT 2002 CSA

AN 1986(4):56-453 METADEX

TI Ultra-Fine Grain Treatment for 65 and 50CrVA Steel Wires.

AU Yang, S.; Li, S.; Zhang, Y.; Su, D.

SO Iron Steel (China) (Aug. 1985) 20, (8), 23-29

DT Journal

LA Chinese

AB A process of rapid heating by means of electrical contact to obtain ultra-fine grain microstructure for 65 and 50CrVA steel wires is presented. Under certain preliminary plastic deformation, a single cycle of heat treatment can produce ultra-fine grain of austenite up to ASTM 11 grade or even finer. The mechanical property of steel wires can be further

raised by the aid of cold working after ultra-fine grain treatment. With orthogonal test method, it was found that the remarkable factor influencing the grain size of austenite is heating rate, and the optimum parameters for these steel wires have been determined. 7 ref.-AA
CC 56 THERMAL TREATMENT
CT Carbon steels: Heat treatment; Low alloy steels: Heat treatment; Wire: Heat treatment; Grain refinement
ALI 65 CCA: SCH; 50CrVA CCA: SAL

L81 ANSWER 20 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1984(8):52-1346 METADEX
TI Semi-Hot Drawing of Stainless Steel.-I. (Synopsis).
AU Bombeke, M.; Neirynck, M.; Lefever, I.
SO Bull. Cercle Etud. Metaux (Sept. 1983) 15, (3), 8-1 to 8-10
Conference: 22nd Meeting on Special Steels (22emes Journees des Aciers Speciaux), Annecy, France, 4-5 May 1983
ISSN: 0366-4104
DT Conference; Journal
LA English; French
AB The effects of semi-hot drawing of stainless steels between 150 deg C and 400 deg C were studied. It was found that semi-hot drawn steel could be drawn down in subsequent operations to greater reductions than cold drawn steel: diameter reductions in AISI 316 steel drawn at 150 deg C were twice those possible in cold drawn steel. Results are given for AISI 301 and 316 steels showing deformation and yield stresses and these are discussed in terms of the microstructures. It is considered possible to simplify production routes using these results to eliminate intermediate annealing treatments.-G.C.
CC 52 WORKING (FORMING)
CT Austenitic stainless steels: Metal working; Hot drawing; Wire drawing; Yield strength; Formability; Plasticity: Temperature effects; Microstructure
ALI 301, 302, 316 CCA: SSA
ET I

L81 ANSWER 21 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1984(3):35-716 METADEX
TI Influence of Molybdenum on Stress Corrosion Cracking of Austenitic Stainless Steel.
AU Pleva, J.
SO Anti-Corros. Methods Mater. (Aug. 1983) 30, (8), 4-9
ISSN: 0003-5599
DT Journal
LA English
AB The resistance to stress corrosion cracking of austenitic stainless steels has been investigated and discussed with respect to the influence of Mo. The testing methods used were dead weight loaded and U-bend specimens in 40% calcium chloride at 100 deg C, pH 5, O2-purged. Cold drawn wires as well as annealed plate specimens were tested in mill delivery condition. The alloys contained Cr 17-25, Ni 10-25 and Mo 0-4.7%. The results indicate a strong influence of Mo on the resistance of austenitic stainless steels against stress corrosion cracking in calcium chloride. The effect is measurable in both cold deformed and annealed condition and is especially strong at Mo-contents above > 3%. The effect of Mo may be a lower crack propagation rate rather than pitting inhibition in the initiation stage of the attack. 16 ref.-AA
CC 35 CORROSION
CT Austenitic stainless steels: Corrosion; Stress corrosion cracking: Alloying effects; Molybdenum: Alloying elements; Calcium chloride: Environment; Plate metal: Corrosion; Wire: Corrosion

ALI S31600, S31703, S30400, 3L, 24, 734LW, 904L, N08904, S31600, 3MM, 725LN, 734L, 34LN, S30403,1.4306, 1.4436, 1.4539, 1.4438, 1.4301, 1.4465, 1.4439 CCA: SSA
ET Mo; U; O2; Cr; Ni; S; N

L81 ANSWER 22 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1983(9):31-3536 METADEX
TI Magnetic Field Effects on Tensile Behavior of Alloys 304 and 310 at 4K.
AU Reed, R.P.; Arvidson, J.M.; Ekin, J.W.; Schoon, R.H.
SO Materials Studies for Magnetic Fusion Energy Applications at Low Temperatures.-V
National Bureau of Standards, Fracture and Deformation Div., Boulder, Colo. 80303. 1982. 71-83
See also AN: 83(9):72-474
DT Book
LA English
AB Experiments were conducted to assess the effects of a steady magnetic field on the austenite stress-strain characteristics at 4K. Wire specimens (0.64 mm dia.) of both a stable Fe-26Cr-20Ni (AISI 310) and metastable Fe-18Cr-9Ni (AISI 304) were measured. A 7-T magnetic field was produced by a split-pair NbTi superconducting magnet with radial access ports and the field was applied perpendicular to the tensile specimen axis. Tests were conducted at 4K with the field off, with the field on, and with the field switched on and off after prescribed amounts of plastic deformation. The Young's modulus, tensile yield strength and tensile stress-strain curves were measured. During magnetic field on/off experiments, no change in austenite flow strength of either alloy was observed from the application or absence of a 7-T field. There was no detectable effect of a constant 7-T magnetic field on the yield strength and Young's modulus of either alloy. However, the specimen-to-specimen yield strength data scatter was large and the application of magnetic field would not necessarily produce changes of flow strength in excess of the data scatter. Discussion is also presented on magnetic field effects on discontinuous yielding and cold worked alloys.-AA
CC 31 MECHANICAL PROPERTIES
CT Austenitic stainless steels: Mechanical properties; Magnetic fields; Stress strain curves: Field effects; Yield strength: Field effects; Modulus of elasticity: Field effects
ALI 304, 310 CCA: SSA
ET K; Cr*Fe*Ni; Cr sy 3; sy 3; Fe sy 3; Ni sy 3; Fe-26Cr-20Ni; Fe-18Cr-9Ni; T; Nb*Ti; Nb sy 2; sy 2; Ti sy 2; NbTi; Nb cp; cp; Ti cp

L81 ANSWER 23 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1982(6):52-785 METADEX
TI High-Strength Steel Wire Rod for Industrial Fasteners and PC Wires Manufactured Without Heat Treatment in the Final Cold Working Process.
AU Gondo, H.; Yoshimura, T.; Araki, M.; Eguchi, N.
SO Nippon Steel Tech. Rep. (Dec. 1980) (16), 142-166
DT Journal
LA English
AB High-strength, high-ductility, high-toughness wire rod with a tensile strength of => 55 kg/mm 2 or more and a reduction of area of => 60% has been developed by Nippon Steel, employing controlled rolling and controlled cooling of 0.10%C-1.5%Mn steel to which the precipitation hardening elements Nb, V and Ti and the hardenability increasing elements Cr and B have been added in very small quantities. This wire rod has a ferritic-pearlitic or bainitic structure, the ferritic-pearlitic being a refined structure. The bainite is based on a low carbon content and transforms at a low temperature because of rapid cooling. Therefore, the ferrite-laths are also fine, and the wire rod is strong and tough. For

this reason, high-strength bolts of 70 kg/mm 2 class and higher can be manufactured without spheroidizing and quenching and tempering; it is possible to manufacture 100 kg/mm 2 class PC wires without lead patenting. The quality of the products obtained by this process is in no way inferior to that of products subjected to the conventional heat treatments. 15 ref.-AA.

CC 52 WORKING (FORMING)
CT High strength low alloy steels: Metal working; Wire rod: Mechanical properties; Wire drawing; Controlled rolling; Mechanical properties: Deformation effects; Microstructure: Deformation effects
ALI M6,M17,CH22K CCA: SCL; CH27K CCA: SCM; H67B,S77B CCA: SCH; NHF60,T-70,NHR80,NHF90,T-110 CCA: SALHS
ET C*Mn; C-1.5%Mn; Nb; V; Ti; Cr; B; K; B*H; H67B; H cp; cp; B cp; B*S; S77B; S cp

L81 ANSWER 24 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1981(11):31-3756 METADEX
TI The Behavior of Elgiloy and Australian Wire Bows Used in the Multiring Orthodontic Technique.
AU Haasser-Becker, J.; Rimlinger, L.
SO PYC Edition. 254, rue de Vaugirard, 75740 Paris Cedex 15, France. 1981. 377-395. Accession Number: 81(11):72-482
Conference: Metallurgie Dentaire, Ecully, France, 24-26 Sept. 1980
DT Conference
LA French
AB Elgiloy wire (38.9 Co, 20.8 Cr, 16.1 Ni, 15.9 Fe, 6 Mo, 1.9 Mn) was supplied in four grades differing in mechanical properties. The Australian wire (71 Fe, 16.5 Cr, 8.9 Ni, 1.6 Mn, 1.5 Mo, 0.2 Co) was available in five grades. The crystal structures, microstructures and tensile properties of the materials as-received are described. On pulling highly cold worked Elgiloy to fracture, a b.c.c. phase is produced at the fracture. In annealed Elgiloy, a reduction of 35% causes the appearance of a h.c.p. phase. Tensile tested cold worked Australian wire transforms completely to alpha '-martensite at the fracture. The effect of annealing on crystal and fiber structure is described. Fractures of bows encountered in orthodontic practice are discussed relative to the amount of deformation, fiber texture and crystal structure.9 refs.-B.L.
CC 31 MECHANICAL PROPERTIES
CT Chromium base alloys: Mechanical properties; Ferrous alloys: Mechanical properties; Wire; Tensile properties; Crystal structure: Deformation effects; Fractography
ALI Elgiloy CCA: CO; Fe-16.5Cr-8.9Ni-1.6Mn-1.5Mo CCA: FE
ET Co; Cr; Ni; Fe; Mo; Mn; C*O; CO; C cp; cp; O cp; Cr*Fe*Mn*Mo*Ni; Cr sy 5; sy 5; Fe sy 5; Mn sy 5; Mo sy 5; Ni sy 5; Fe-16.5Cr-8.9Ni-1.6Mn-1.5Mo

L81 ANSWER 25 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1981(10):62-279 METADEX
TI Formability Limits of Metal/Metal Composites on Rolling in the Direction of Fiber Alignment.
AU Moore, J.J.; Wilson, D.V.; Roberts, W.T.
SO Mater. Sci. Eng. (Apr. 1981) 48, (1), 107-112
DT Journal
LA English
AB Hot pressed composites were produced using superpure Al, a work-hardening Al alloy (7% Mg - Al) and a precipitation-hardening Al alloy (Duralumin) as matrix materials, each reinforced with wires of 302 and 304 stainless steel, high carbon (0.9% C) steel, low-C (0.2% C) steel and Cu. The composites were deformed by cold rolling in the direction of wire alignment to determine the limit of reduction achievable prior to the onset of plastic instability of the reinforcement. In each case an

increased strain to fracture was achieved with the composite compared with that of the reinforcement alone. A simplified model was developed to explain the increased formability of the composites which depended on the relative flow strengths of the matrix and reinforcement and the rate of work hardening of the reinforcement.9 refs.-AA
CC 62 COMPOSITES
CT Aluminum base alloys: Fiber metallurgy; Austenitic stainless steels: Fiber metallurgy; Carbon steels: Fiber metallurgy; Copper: Fiber metallurgy; Fiber composites: Metal working; Cold rolling; Formability
ALI Al-7Mg, Duralumin CCA: AL; 302, 304 CCA: SSA
ET Al; Mg; C; Cu; Al*Mg; Al sy 2; sy 2; Mg sy 2; Al-7Mg

L81 ANSWER 26 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1981(10):56-972 METADEX
TI The Patenting of Steel Rod and Wire.
AU Franklin, J.R.; Allen, C.
SO Wire Ind. (Nov. 1980) 47, (563), 958-966
DT Journal
LA English
AB A review of the literature has been made dealing with aspects relevant to the structure and properties of patented and cold drawn carbon steel rod. The effects of deformation strengthening are discussed and equations predicting strength levels reviewed. 33 ref.-AA
CC 56 THERMAL TREATMENT
CT Reviews; Carbon steels: Heat treatment; Patenting (metallurgical); Rods: Heat treatment; Wire: Heat treatment; Tensile strength: Alloying effects; Wire drawing; Austenitizing; Strain hardening

L81 ANSWER 27 OF 27 METADEX COPYRIGHT 2002 CSA
AN 1980(9):72-308 METADEX
TI Effects of Radiation on Structural Materials.
AU Sprague, J.A.; Kramer, D.
NR STP No. 683
SO American Society for Testing and Materials. 1916 Race St., Philadelphia, Pa. 19103. 1979. Pp 684, 51/4 x 91/4 in., Illustrated, dollars U.S. 58.50 Conference: Richland, Wash., 11-13 July 1978
DT Conference; Report
LA English
AB Contents: A. WOLFENDEN, "Determination of the Nature of Neutron Irradiation-Induced Dislocation Loops in Magnesium Using Electron Irradiation in the Transmission Electron Microscope"; N. IGATA, A. KOHYAMA and K. ITADANI, "Radiation Effects on Molybdenum Alloys Bombarded by Electrons in a High-Voltage Electron Microscope"; B.O. HALL and D.I. POTTER, "Microstructural Development During Low-Dose Irradiation"; A. JOSTSONS, P.M. KELLY, R.G. BLAKE and K. FARRELL, "Neutron Irradiation-Induced Defect Structures in Zirconium"; D.O. NORTHWOOD, "Irradiation Growth in Zirconium and Its Alloys"; M.R. HAYNS, M.H. WOOD and R. BULLOUGH, "Dependence of Cavity Nucleation Density Upon Gas Implantation Rate and Its Importance in Dual-Beam Irradiation Conditions"; F.W. WIFFEN, "Response of Inconel 600 to Simulated Fusion Reactor Irradiation"; D.J. MICHEL and H.H. SMITH, "Effects of Neutron Irradiation on the Microstructure of Niobium and Niobium-Base Alloys"; J.B. WHITLEY, G.L. KULCINSKI, H.V. SMITH, JR. and P. WILKES, "Effects of Bombarding Ions on the Void Swelling Profile in Nickel"; M.R. HAYNS and R. BULLOUGH, "Development of Physically Based Void Swelling Equations for Engineering and Design Use"; F.A. GARNER, W.G. WOLFER and H.R. BRAGER, "A Reassessment of the Role of Stress in Development of Radiation-Induced Microstructure"; L.E. REHN, P.R. OKAMOTO, D.I. POTTER and H. WIEDERSICH, "Radiation-Induced Segregation in Nickel-Silicon Alloys"; D.S. GELLES, "An Example of Precipitate Stability in Reactor-Irradiated Nimonic PE16"; H.R. BRAGER and

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CT Radiation damage; Pressure vessels; Creep (materials): Radiation effects

ET N; K; P; H; B; C; D; J; In